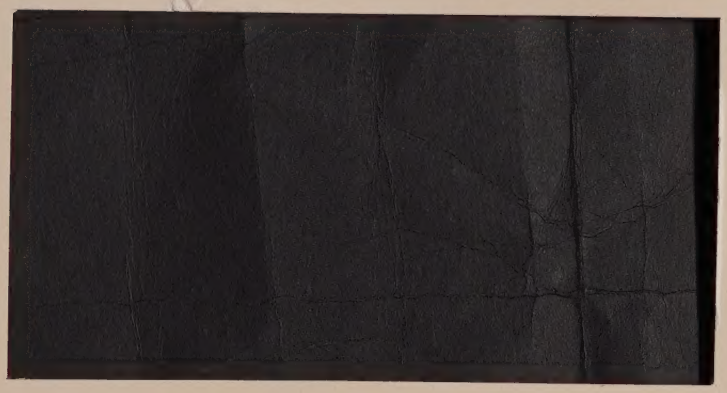


MP MASTER
MA29436

ac-dc power supplies

BEHLMAN-INVAR ELECTRONICS CORP.
1723 CLOVERFIELD BLVD.
SANTA MONICA, CALIF.

REPRESENTATIVES IN ALL PRINCIPAL CITIES AND CANADA

EX 3-9611 • UP 0-9346 • TWX SMON-7098

MANUAL

OPERATIONAL - MAINTENANCE

MODELS: TP AND TPA SERIES

TPA-30-1000

DC POWER SUPPLIES

Publication No. 9689

NOTICE:

The information contained herein is for the sole purpose of providing the data used in operating and maintaining the above-captioned power supplies and may not be used for any other purpose or reproduced in any form, either in whole or in part, without the written consent of Behlman-Invar Electronics Corporation.

BEHLMAN-INVAR ELECTRONICS CORP.
1723 CLOVERFIELD BOULEVARD
SANTA MONICA, CALIFORNIA
EXbrook 3-9611 TWX S. MON. 7098

October, 1962

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_10728

# TABLE OF CONTENTS


| SECTION | | | PAGE |
|---|---|---|---|
| I | Introduction and Description | | 1 |
| | 1-1 | General | 1 |
| | 1-2 | Purpose | 1 |
| | 1-3 | Warranty | 1 |
| | 1-4 | Preparation for Use and Reshipment | 2 |
| | 1-5 | Quality Control and Inspection | 3 |
| | 1-6 | Safety Notes | 3 |
| | 1-7 | Electrical Specifications | 4 |
| | 1-8 | Environmental Specifications | 5 |
| | 1-9 | Mechanical Specifications | 5 |
| | 1-10 | Applicable Documents | 6 |
| II | Principles of Operation and Instruction | | 7 |
| | 2-1 | Design Objective | 7 |
| | 2-2 | Circuit Theory of Operation | 7 |
| | 2-3 | Internal Reference Supply | 9 |
| | 2-4 | Auxiliary Supply | 9 |
| | 2-5 | Short Circuit Protection | 9 |
| | 2-6 | Controls | 10 |
| | 2-7 | Operational Procedures | 10 |
| III | Maintenance Procedures | | 11 |
| | 3-1 | Maintenance and Trouble Shooting | 11 |
| | 3-2 | Trouble Shooting Procedures | 11 |
| APPENDIX | | | 13 |

## LIST OF ILLUSTRATIONS


| TABLE | | PAGE |
|---|---|---|
| 1-1 | Electrical Specifications | 4 |
| 1-2 | Mechanical Specifications | 5 |
| **FIGURE** | | |
| 2-1 | Functional Block Diagram | 8 |
| A-1 | Schematic | Appendix |
| A-2 | Test Voltage Chart | Appendix |

# SECTION I
# INTRODUCTION AND DESCRIPTION

## 1-1. GENERAL.

Behlman-Invar Electronics Corporation, who have pioneered many of the more important advancements in the field of transistorized power supplies, are pleased to submit this instruction manual for the Model TP and TPA Series power supply units, Dash 2, 5, 10, 15 and 30 Models.

These models are precision transistorized power supplies which operate from 105/125 volts ac at 55/65 cps line voltage, and deliver a precisely regulated dc output. (See Paragraph 1-7, Electrical Specifications.) These units may be used in the laboratory or incorporated in other electronic equipment as a source of high quality, fully regulated dc power.

## 1-2. PURPOSE.

To provide power supplies under design criteria conforming to the latest state of the art.

To provide an operational and instruction manual containing complete information for assistance when using the units.

## 1-3. WARRANTY.

Seller warrants the end product of its design and construction to be free from defects in material and workmanship. Any component parts other than vacuum tubes, fuses, blower motors, indicating lamps, and other indicating devices (except as warranties on these items are passed on to the seller by its suppliers), which become defective during the first year after shipment will be replaced free of charge by the seller, provided that the instrument is returned with transportation charges prepaid by the original purchaser and that our examination discloses to our satisfaction that the instrument is defective, but if the apparatus is installed, or its installation supervised, by the seller, said year

shall run from the completion of the installation, provided that same is not unreasonably delayed by the buyer.

The condition of any tests shall be mutually agreed upon, and the seller shall be notified, and may be represented at, all tests that may be made. The liability of the seller to the buyer (except as to title) arising out of the supplying of the said apparatus, or its use, whether on warrant, contract, or otherwise, shall not in any case exceed the cost of correcting defects in the apparatus as herein provided, and upon the expiration of said year all such liability shall terminate.

The foregoing shall constitute the sole remedy of the buyer, and the sole liability of the seller.

## 1-4. PREPARATION FOR USE AND RESHIPMENT.

Unpack the instrument with care and inspect it for any damage which it may have incurred in transit. If there is any damage, or if the unit fails to operate properly in accordance to instructions (see Paragraph 2-7), a claim should be filed with the carrier, with a copy of the Claim Agent's report being forwarded to Behlman-Invar Electronics Corporation.

On packaging for reshipment use adequate shock-absorbent material within the carton to prevent the instrument's sharp corners from protruding which would result in unit damage.

NOTE: DO NOT RETURN THE INSTRUMENT TO THE FACTORY WITHOUT PRIOR AUTHORIZATION FROM BEHLMAN-INVAR ELECTRONICS CORPORATION.

## 1-5. QUALITY CONTROL AND INSPECTION.

Behlman-Invar Electronics Corporation functions under a company-wide quality assurance program which insures that our customer receives equipment manufactured to the most exacting standards. This quality assurance system is based on the best commercial practices augmented by policies and procedures required under MIL Q-9858

## 1-6. SAFETY NOTES.

WARNING

Operation of the Behlman-Invar power supplies involves the use of high voltage. Use EXTREME CAUTION when any internal adjustments or tests are being performed.

CAUTION

When remote sensing is not used, VERIFY that the REMOTE SENSE shorting jumpers are correspondingly installed on the Connectors J2 and J3, J4 and J5, to avoid damaging the unit. (See Schematic, Figure A-1, Note B.)

## 1-7. ELECTRICAL SPECIFICATIONS.

The following tabulation lists the electrical characteristics for the TP and TPA Series power supplies (5 each).

| | Output dc | | Regulation | | Ripple | Output Z | | Transients | |
|---|---|---|---|---|---|---|---|---|---|
| Model | E (v dc) | I (amps) | Line mV | no load to full load mV | mV rms max. | ohms dc | ohms 100 kc | ±10% line | Recovery time no load to full load μsec. max. |
| Dash-2 | 0-36 | 2 | 10 | 5 | 0.6 | 0.002 | 0.1 | None | 20 |
| Dash-5 | 0-36 | 5 | 10 | 5 | 0.5 | 0.001 | 0.1 | None | 30 |
| Dash-10 | 0-36 | 10 | 10 | 5 | 0.5 | 0.0005 | 0.1 | None | 50 |
| Dash-15 | 0-36 | 15 | 10 | 5 | 0.5 | 0.0003 | 0.1 | None | 75 |
| Dash-30 | 0-36 | 30 | 10 | 5 | 1.0 | 0.0002 | 0.1 | None | 100 |

TABLE 1-1.

Input Line Voltage
For All 5 Models: 105/125v ac at 55/65 cps, single phase.

Remote Sensing: Remote sensing is provided so that the selected output potential is maintained across a remote load despite a nominal line drop (due to their length) in the interconnecting cables.

Short Circuit Protection: Unit is capable of being shorted continuously without damage. Turning on the unit while the output or remote load is shorted causes no damage, and when the short is removed the voltage and current return to preset values.

## 1-8. ENVIRONMENTAL SPECIFICATIONS.

F1: Fuse located on the rear of the chassis and inserted in the ac input to the supply.

F2: Fuse located on the rear of the chassis and inserted in the raw dc output of the supply.
(See Schematic of respective models - Fig. A-1).

Operating Temperature: 0° to 50° C.

## 1-9. MECHANICAL SPECIFICATIONS.

| Model | Width | Height | Depth | Weight |
|---|---|---|---|---|
| Dash-2 | 19" | 5-1/4" | 10" | 30 |
| Dash-5 | 19" | 5-1/4" | 13" | 40 |
| Dash-10 | 19" | 5-1/4" | 15" | 51 |
| Dash-15 | 19" | 5-1/4" | 20" | 72 |
| Dash-30 | 19" | 7" | 20" | 100 |

TABLE 1-2

| | |
|---|---|
| Mounting: | All units may be mounted on a standard 19" relay rack panel. |
| Terminals: | Front and rear-mounted terminals are incorporated which provide J1 through J9. (For functions see Schematic, Figure A-1.) |

1-10. APPLICABLE DOCUMENTS.

| | |
|---|---|
| Design Control: | Behlman-Invar Drawing Numbers as follows: |
| Dash - 2: | 001A-0095 |
| Dash - 5: | 002A-0095 |
| Dash- 10: | 003A-0095 |
| Dash- 15: | 006A-0095 |
| Dash- 30: | 009-0095 |

# SECTION II
# PRINCIPLES OF OPERATION AND INSTRUCTION

## 2-1. DESIGN OBJECTIVE.

The design parameters of the Model TP and TPA Series power supply contribute to their operation in the following manner:

a. Provide a dc power supply fully regulated that is variable from 0 to 36v as specified in the electrical specifications. (See Paragraph 1-7.)

b. Provide high efficiency operation by allowing only a minimum of internal wattage dissipation regardless of output load conditions.

c. Provide fully rectified, filtered and stabilized voltage for the regulation circuitry, transformer section, filter section and Zener diode section.

d. Provide a remote sensing function, permitting the output voltage to be regulated from the voltage sensed at the load end. This feature ensures that the output voltage at the load remains constant, within the regulation specifications, with a nominal line drop.

## 2-2. CIRCUIT THEORY OF OPERATION.

Input ac is supplied from J1, Pins 2 and 3, through S1 and DS1 to T1 and T3, the auto and auxiliary transformers, respectively.

The ac from T1 passes through Fuse F1 to T2, the step-down power transformer of the raw dc section of the power supply. For the TPA-2, the output of T1 is applied to the rectifier CR1 through CR4 and then filtered through the network of R41-1, R41-2, C1-1 and C1-2. For the TPA-5, TPA-10, TPA-15, and TP-30, the same theory applies with the exception that R41-1 and R41-2 network is deleted.

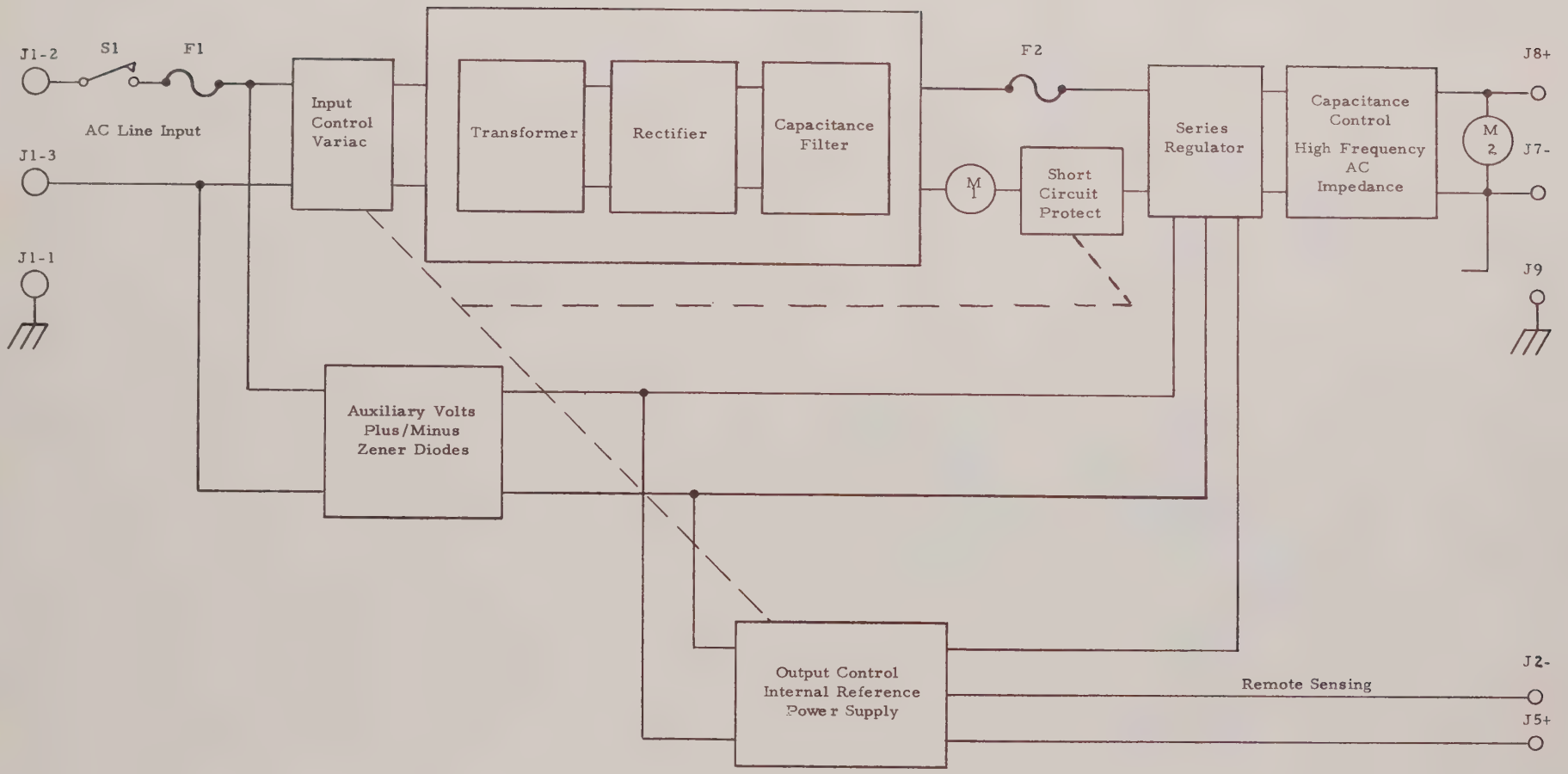



FIGURE 2-1. TP SERIES FUNCTIONAL BLOCK DIAGRAM

The raw dc is then fed through F2 being applied to the series regulator pass transistors Q10-1 and Q10-2, whose bases are driven by the power driver Q9 and the small signal Q8, whose bases are in turn being driven by the balanced amplifiers Q6 and Q7.

The power supply output voltage is sensed at the base of Q7 and compared with a very stable reference voltage developed across R27, the output coarse voltage control, and R26, the output fine voltage control.

2-3. INTERNAL REFERENCE SUPPLY.

The internal reference supply section, consisting in part by the transistors Q2, Q3, Q4 and Q5, and Zener reference diode Cr 12, is essentially in itself a small regulated dc supply, whose purpose is to furnish a highly regulated comparison voltage to the base of Q6.

2-4. AUXILIARY SUPPLY.

Raw dc being furnished to the internal reference supply (See Paragraph 2-3) is obtained from the auxiliary supply section and fed from Transformer T3 to the rectifiers CR5 through CR8, then passing through the filtering network of R1, R2, C2, and C3. Zener diode CR9 furnishes the minus output voltage and CR10 furnishes the plus output voltage for the auxiliary supply.

2-5. SHORT CIRCUIT PROTECTION.

The maximum output current adjust section and short circuit protection consist of Transistor Q1 and Potentiometer R17.

A reference voltage of approximately one volt is established at the emitter of Q1 by the diode CR11 and the dropping resistors R7 and R8. As the current increases through R17 a voltage drop occurs which is tied to the base of Q1 through the potentiometer R16. As this voltage reaches and exceeds the emitter reference voltages, Q1 is turned on. The collector of Q1 is tied through R11 to the base of the small signal driver Q8, thus when Q1 is turned on Q8's base is grounded and current decreases.

In order to obtain the current cutback feature of our short circuit protection the reference voltages of the emitter of Q1 is lowered as the output voltage drops in short circuit and requires less current through R17 to maintain cut-off in the pass transistor.

## 2-6. CONTROLS.

a. OUTPUT VOLTAGE COARSE, ganged mechanically with R7, R27, and T1, auto transformer, located on the front panel.

b. OUTPUT VOLTAGE FINE, for R26, located on the front panel.

c. MAXIMUM CURRENT ADJUST. for R17, located on the front panel.

d. J1, power input Jones plug, located on the rear of the chassis.

e. S1, toggle switch for ac line input, located on the front panel.

f. DS1, amber "AC ON" indicator light, located on the front panel.

g. M1, 0 to 3 ammeter, located on the front panel.

h. M2, 0 to 40v dc voltmeter, located on the front panel.

i. J2, J3, J4, J5 and J6, located on the rear of the chassis. (For function see Schematic, Figure A-1.)

j. J7, J8 and J9, located on the front panel. (For function see Schematic, Figure A-1.)

## 2-7. OPERATIONAL PROCEDURES.

a. CONNECT: AC line to J1.

b. ACTIVATE: S1 to the "ON" position.

c. MONITOR: DS1 for "ON" indication.

d. ADJUST: Fine and coarse output voltage controls for the desired voltage.

e. ADJUST: Maximum current control for the desired current flow.

f. MONITOR: M1 and M2 for the desired readings.

# SECTION III
# MAINTENANCE PROCEDURES

## 3-1. MAINTENANCE AND TROUBLE SHOOTING.

The power supply does not require any periodic maintenance other than cleaning to remove excessive dust and dirt. If it is necessary to replace components, use only first quality commercial components of values and types indicated. No selected components are used. When replacing components or trouble shooting, observe "warning" (See Warning Notice, Paragraph 1-6) since dangerous voltages may exist in the power supply. If it is ever necessary to replace the variable autotransformer or either of the two potentiometers connected to the variable autotransformer by means of the gear chain, the following check should be used to insure that the gearing is correct. With the coarse output voltage control turned completely counterclockwise, the variable autotransformer T1 and the potentiometers R7 and R27 should be positioned in the same manner.

## 3-2. TROUBLE SHOOTING PROCEDURES.

a. SYMPTOM: No output voltage.

POSSIBLE CAUSE: Fuse blown.

REPAIR PROCEDURE: Check for damaged rectifiers or shorted input capacitors or transformer, before replacing ac fuse. If dc fuse is blown, then check for possibility of overheating and short circuit. Remove short circuit.

b. SYMPTOM: Poor load regulation.

POSSIBLE CAUSE: Maximum output current adjust potentiometer set at too low a value.

REPAIR PROCEDURE: Set potentiometer to proper maximum current setting. This is about 20% higher than the desired maximum current.

c. SYMPTOM: Poor regulation and output cannot be reduced to zero by output voltage control.

POSSIBLE CAUSE: One of the series regulating transistors, Q10-1 or Q10-2 on the heatsink, or Q9, on the board next to the heatsink, or Q2, on the main component board, is shorted.

REPAIR PROCEDURE: Replace transistor. To determine which transistor is shorted, open the emitter of Q8. If the output voltage drops to zero (without load), transistor Q8 should be replaced.

d. SYMPTOM: Power transformer and variable autotransformer overheated.

POSSIBLE CAUSE: One or more of the rectifiers CR1 to CR4 are defective.

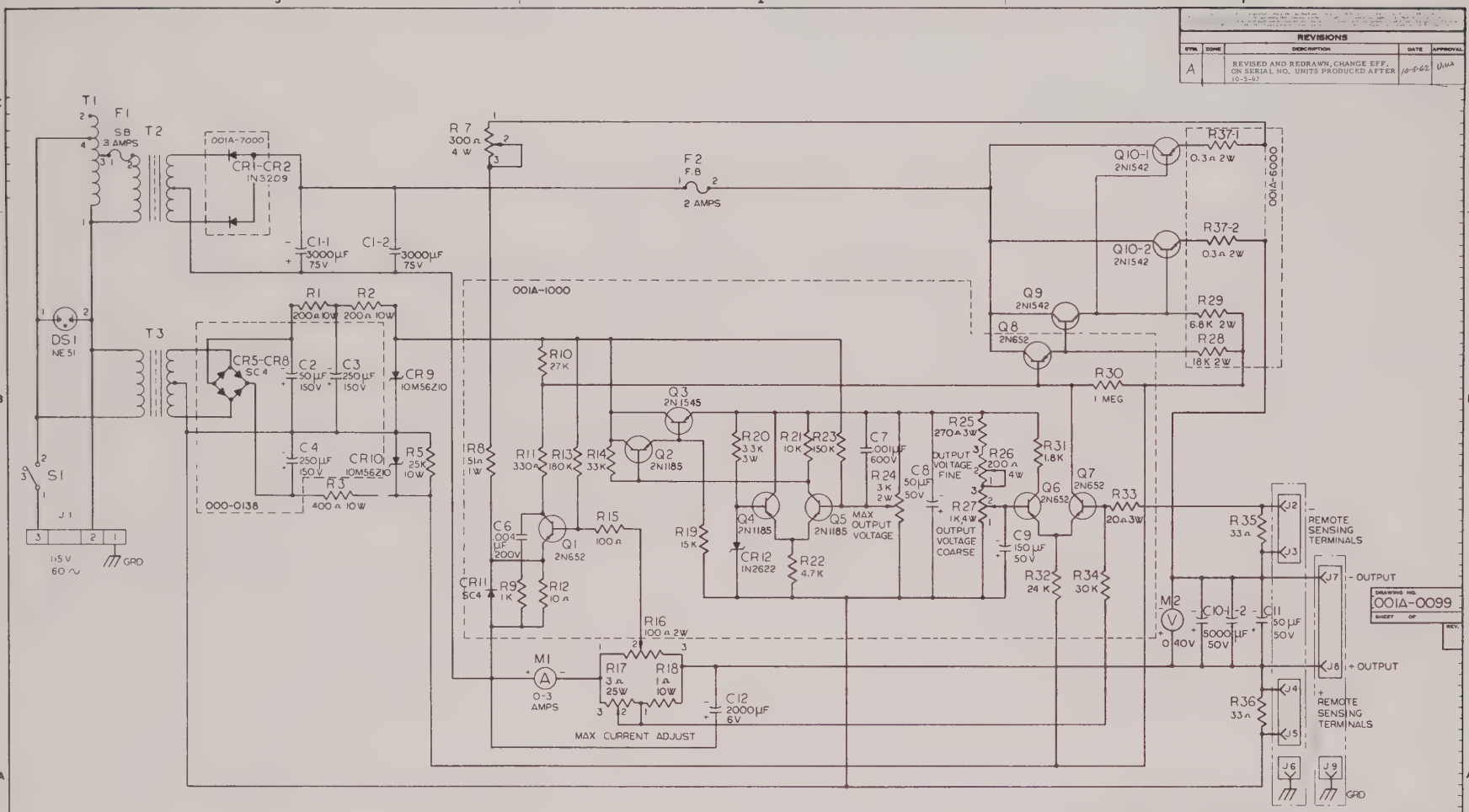
REPAIR PROCEDURE: Replace rectifier.

e. SYMPTOM: Output voltage floats erratically.

POSSIBLE CAUSE: Remote sensing jumpers not tightly connected, or, if remote sensing is being used, remote sensing leads not properly connected.

REPAIR PROCEDURE: Check sensing connections.

# APPENDIX




| REVISIONS | | | | |
|---|---|---|---|---|
| STBL | ZONE | DESCRIPTION | DATE | APPROVAL |
| A | | REVISED AND REDRAWN, CHANGE EFF. ON SERIAL NO. UNITS PRODUCED AFTER 10-5-67 | 10-5-67 | [illegible] |

3. ALL RESISTORS 1/2 WATT ± 5 %

2 T1, R7, & R27 ARE MECHANICALLY GANGED

1 THIS DWG SUPPLIED FOR THE OPERATION & MAINT. OF BEHLMAN-INVAR EQUIP. & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.

NOTES: UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON .XX ± .010 .XXX ± .010 ANGLES ± 30'

FINISH

SURFACE ROUGHNESS FINISH PER MIL-STD-10

| ITEM | PART NO. | REQ'D | DESCRIPTION | MATERIAL | MATL SPEC. |
|---|---|---|---|---|---|

LIST OF MATERIAL

| | | |
|---|---|---|
| DRAWN | CO MONROY | 6 & 62 |
| CHECKED | | |
| DESIGNED | | |
| CHANGED | DM | 7/18/62 |
| APPROVED | DMartin | 7/18/62 |

TITLE: SCHEMATIC TP2

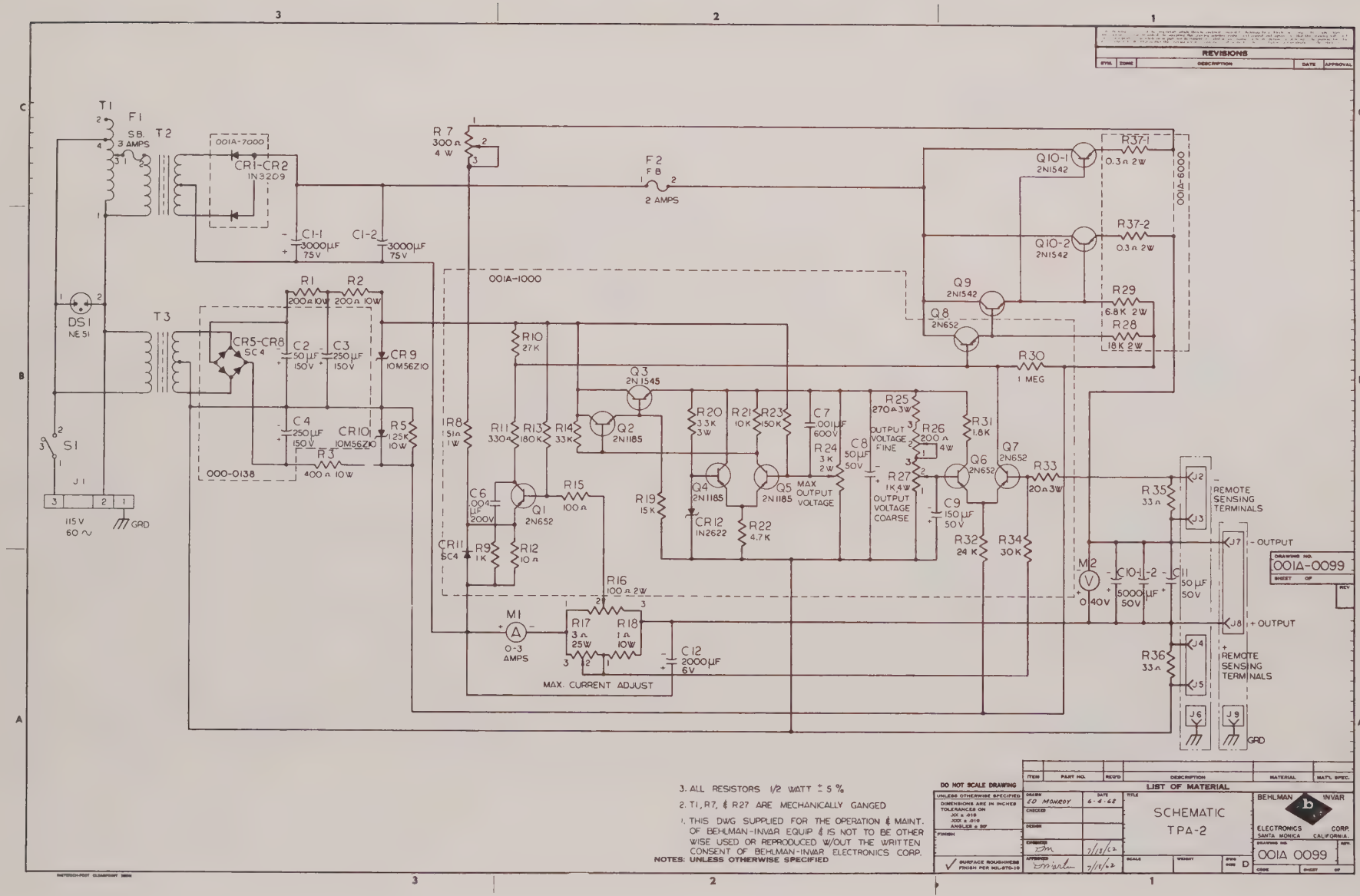
SCALE | WEIGHT | SIZE D

BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA

DRAWING NO. 001A 0099 REV. A

CODE | SHEET OF

DRAWING NO. 001A-0099 SHEET OF REV.




3. ALL RESISTORS 1/2 WATT ± 5 %

2. T1, R7, & R27 ARE MECHANICALLY GANGED

1. THIS DWG SUPPLIED FOR THE OPERATION & MAINT. OF BEHLMAN-INVAR EQUIP & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.

NOTES: UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON .XX ± .010 .XXX ± .010 ANGLES ± 30'

FINISH

SURFACE ROUGHNESS FINISH PER MIL-STD-10

REVISIONS

| SYM | ZONE | DESCRIPTION | DATE | APPROVAL |
|---|---|---|---|---|

LIST OF MATERIAL

| ITEM | PART NO. | REQ'D | DESCRIPTION | MATERIAL | MAT'L SPEC. |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| DRAWN | LO MONROY | DATE 6-4-62 |
| CHECKED | | |
| DESIGN | | |
| ENGINEER | | 7/12/62 |
| APPROVED | | 7/12/62 |

TITLE: SCHEMATIC TPA-2

SCALE | WEIGHT | SIZE D

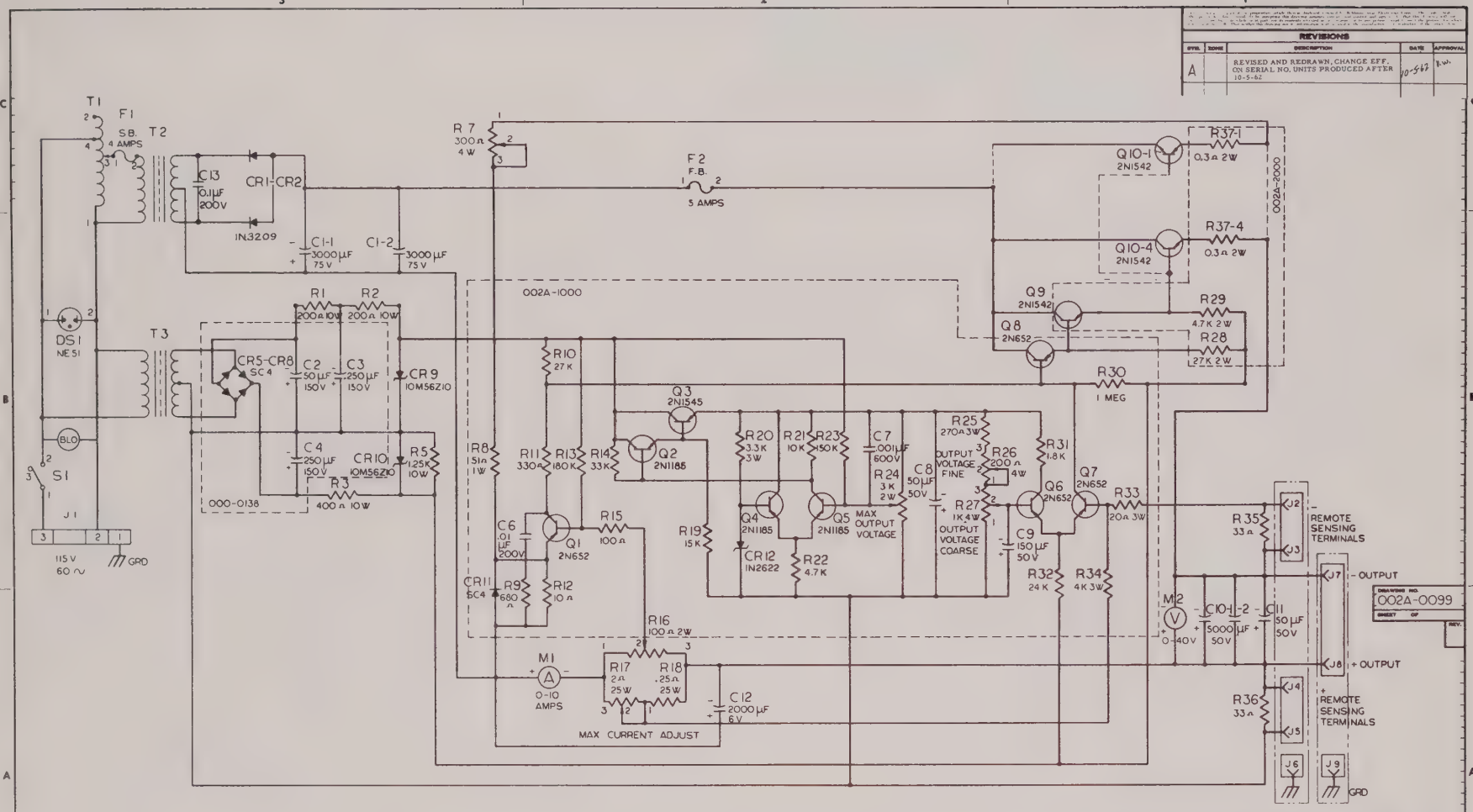
BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA

DRAWING NO. 001A 0099

CODE | SHEET OF

DRAWING NO. 001A-0099

SHEET OF | REV




| REVISIONS | | | | |
|---|---|---|---|---|
| SYM. | ZONE | DESCRIPTION | DATE | APPROVAL |
| A | | REVISED AND REDRAWN, CHANGE EFF. ON SERIAL NO. UNITS PRODUCED AFTER 10-5-62 | 10-5-62 | |

3. ALL RESISTORS 1/2 WATT ± 5 %
2. T1, R7, & R27 ARE MECHANICALLY GANGED
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINT. OF BEHLMAN-INVAR EQUIP. & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.

NOTES: UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES; TOLERANCES ON .XX ± .010, .XXX ± .010, ANGLES ± 30'; FINISH; ✓ SURFACE ROUGHNESS FINISH PER MIL-STD-10

| ITEM | PART NO. | REQ'D | DESCRIPTION | MATERIAL | MAT'L SPEC. |
|---|---|---|---|---|---|

LIST OF MATERIAL

| | | |
|---|---|---|
| DRAWN | ED MONROY | DATE 6-4-62 |
| CHECKED | | |
| DESIGN | | |
| ENGINEER | [illegible] | 7/18/62 |
| APPROVED | [illegible] | 7/18/62 |

TITLE: SCHEMATIC TP 5

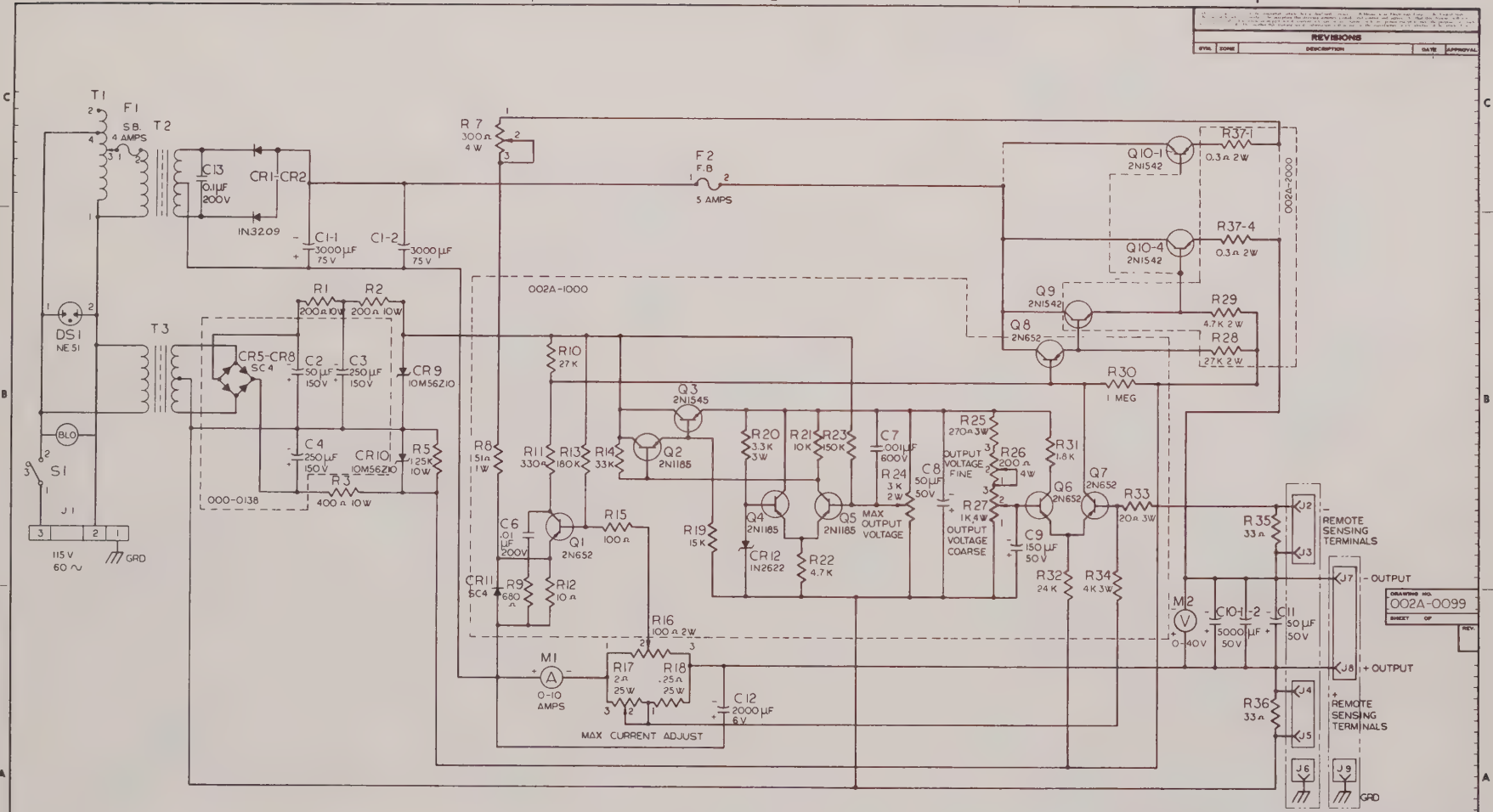
SCALE | WEIGHT | SIZE D

BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA

DRAWING NO. 002A-0099 REV. A

SHEET OF

DRAWING NO. 002A-0099 SHEET OF REV.




| REVISIONS | | | | |
|---|---|---|---|---|
| SYM. | ZONE | DESCRIPTION | DATE | APPROVAL |

3. ALL RESISTORS 1/2 WATT ± 5 %

2. T1, R7, & R27 ARE MECHANICALLY GANGED

1. THIS DWG SUPPLIED FOR THE OPERATION & MAINT. OF BEHLMAN-INVAR EQUIP. & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.

**NOTES: UNLESS OTHERWISE SPECIFIED**

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
.XX ± .015
.XXX ± .010
ANGLES ± 30'
FINISH

✓ SURFACE ROUGHNESS FINISH PER MIL-STD-10

| ITEM | PART NO. | REQ'D | DESCRIPTION | MATERIAL | WT'L SPEC. |
|---|---|---|---|---|---|

LIST OF MATERIAL

| | | |
|---|---|---|
| DRAWN | ED MONROY | DATE 6-4-62 |
| CHECKED | | |
| DESIGNED | [illegible] | 7/18/62 |
| APPROVED | [signature] | 7/18/62 |

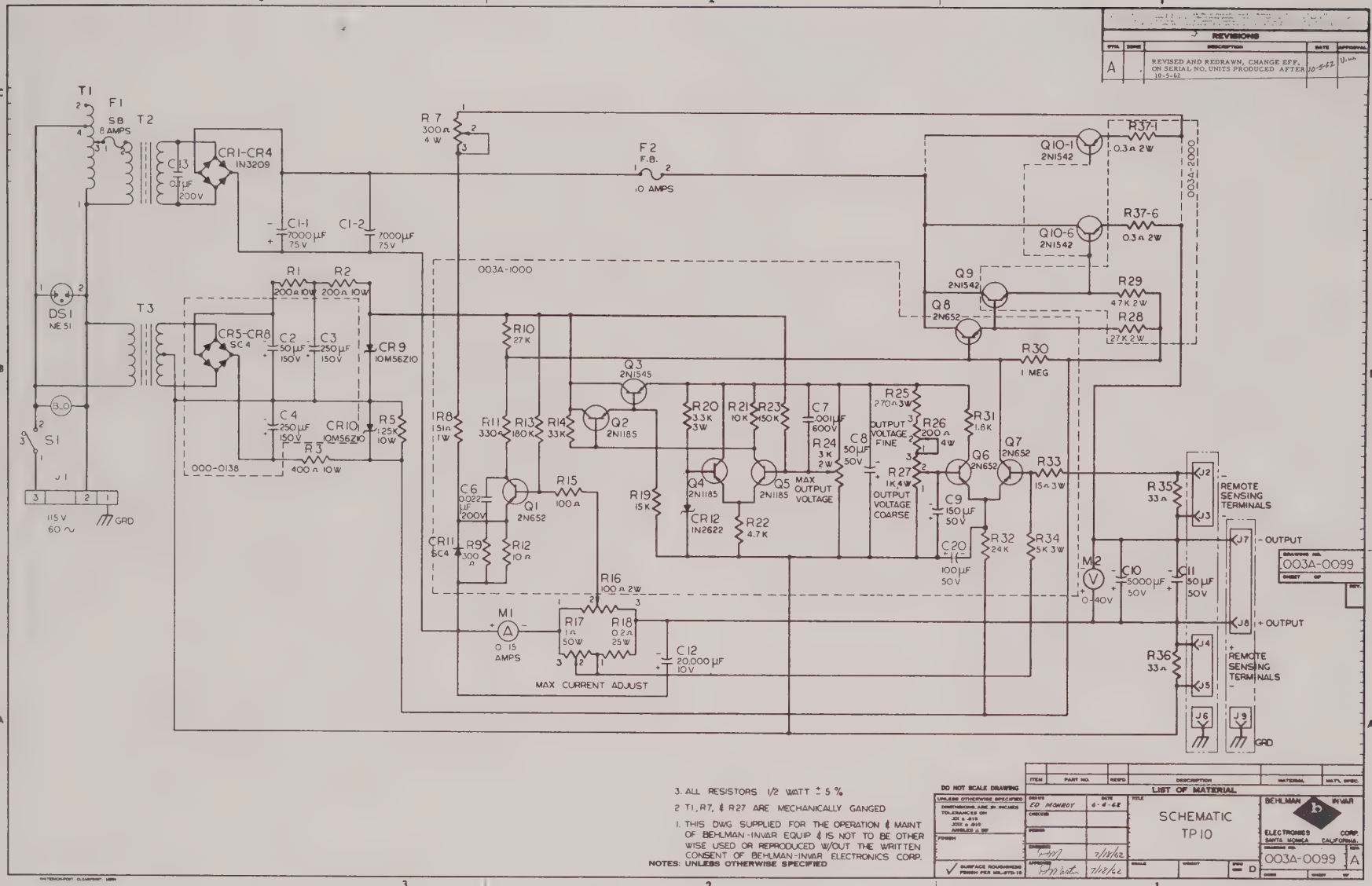
TITLE: SCHEMATIC TPA-5

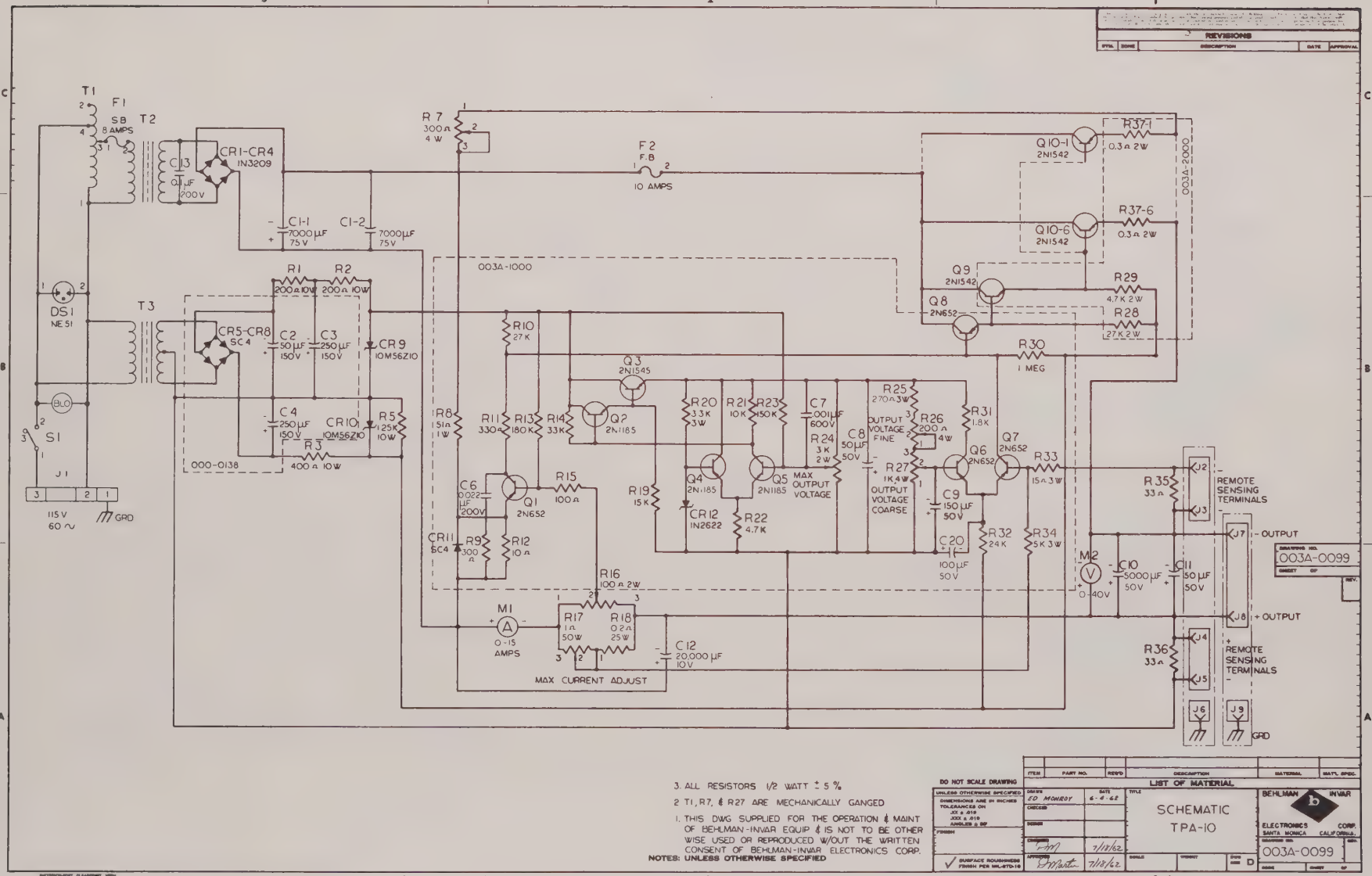
SCALE | WEIGHT | SIZE D

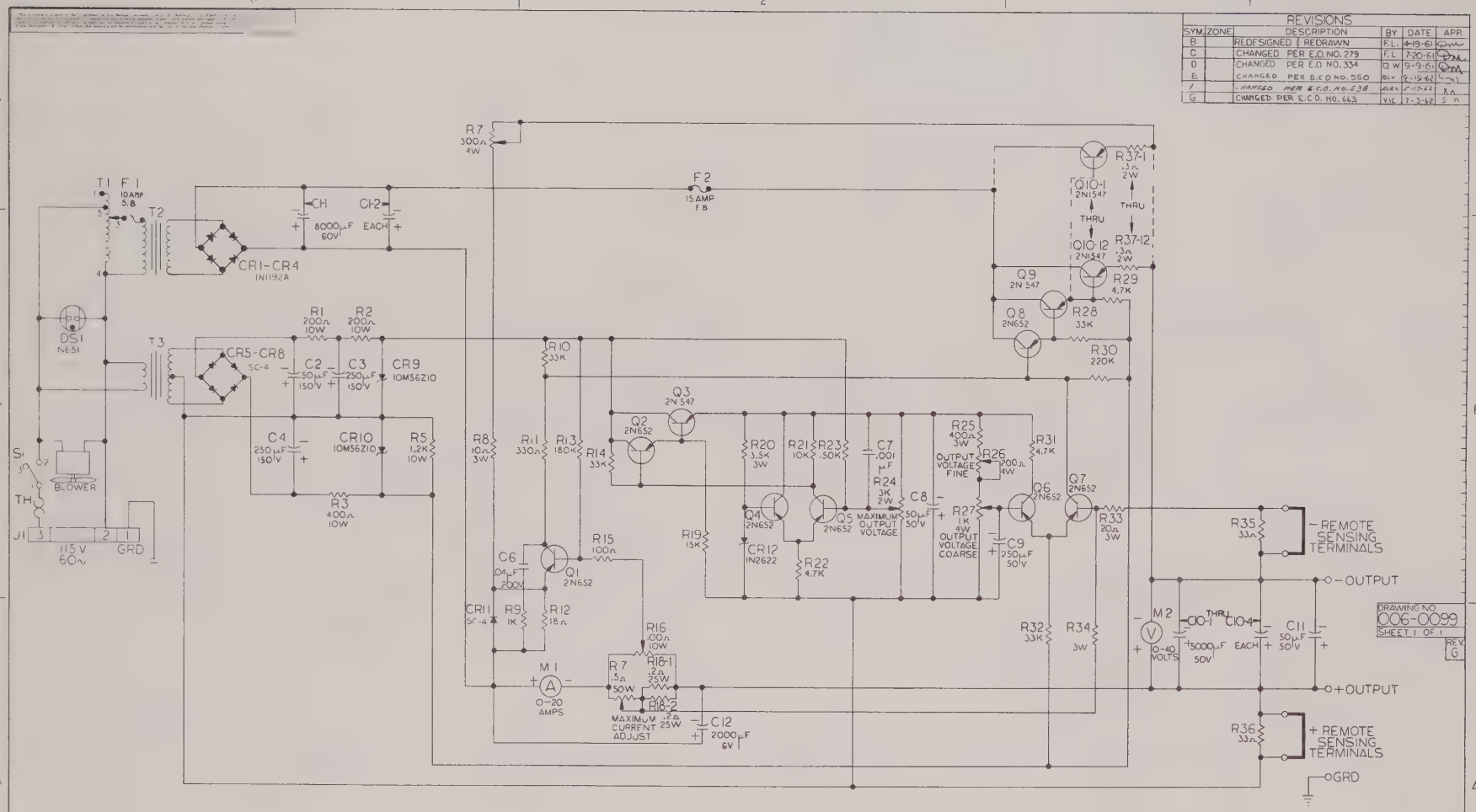
BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA

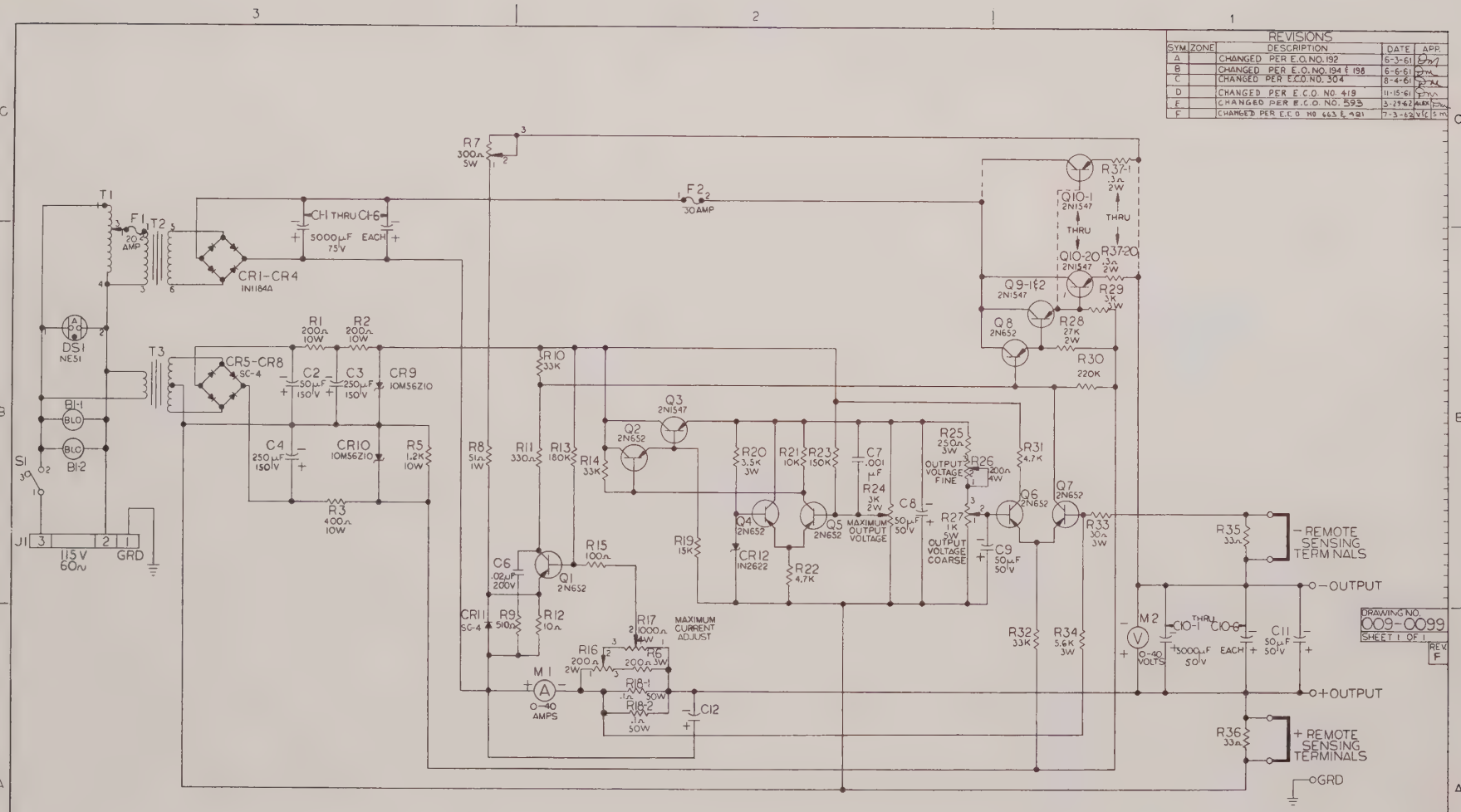
DRAWING NO. 002A-0099

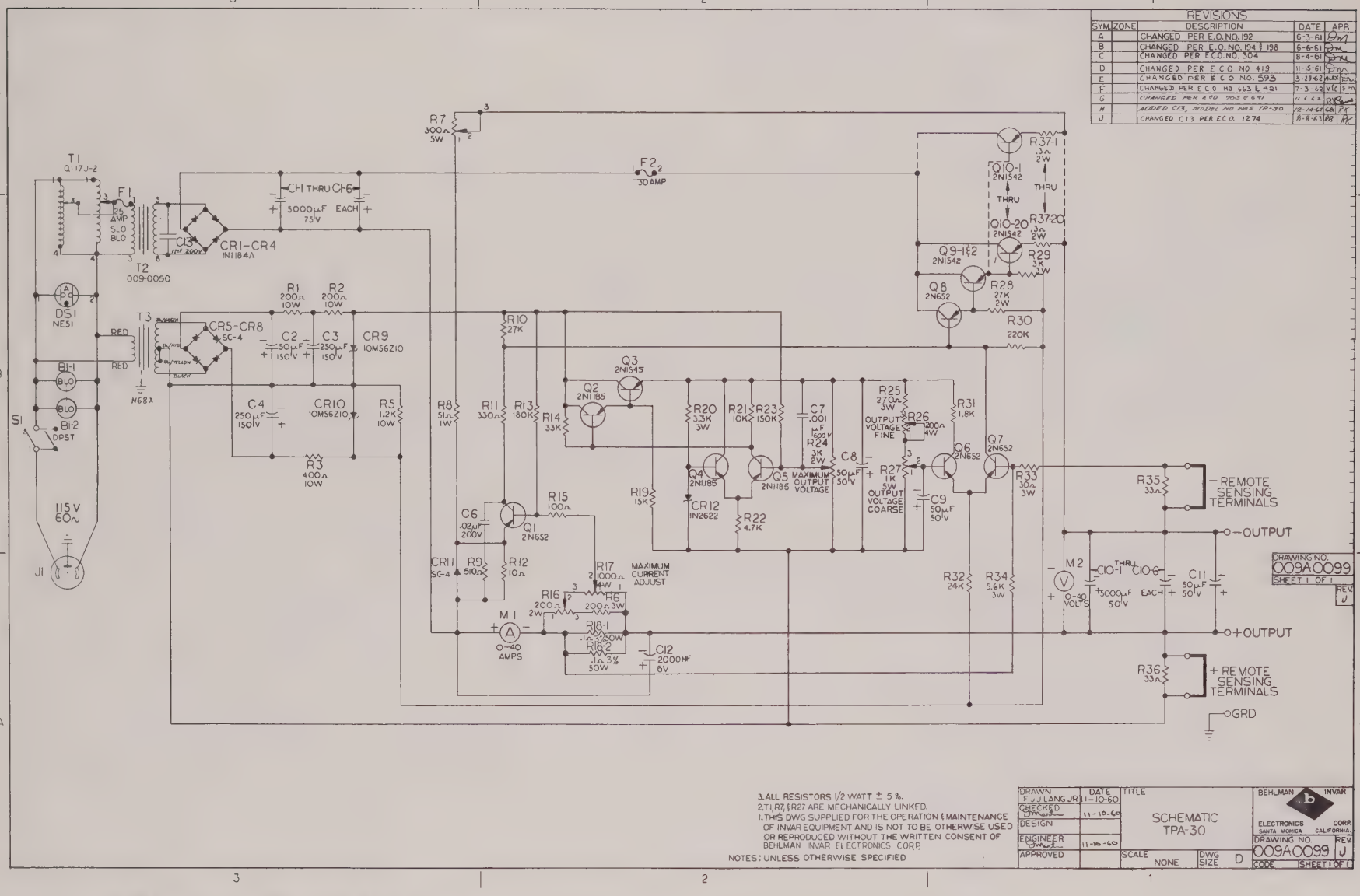
SHEET OF | REV.

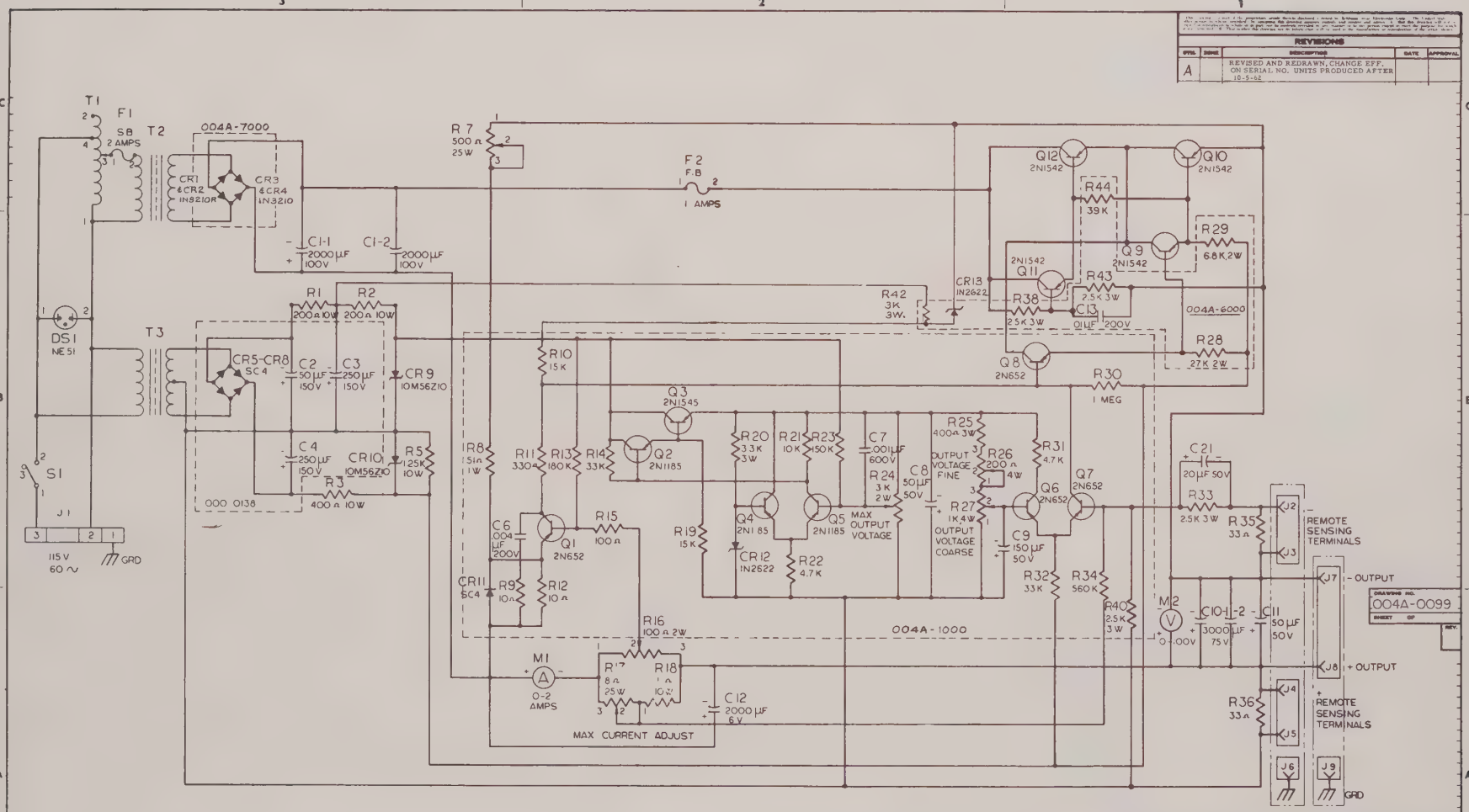

REVISIONS
A
REVISED AND REDRAWN, CHANGE EFF. ON SERIAL NO. UNITS PRODUCED AFTER 10-5-62
10-5-62
T1
F1
SB 8 AMPS
T2
CR1-CR4 IN3209
C13 0.1 µF 200V
C1-1 7000 µF 75V
C1-2 7000 µF 75V
R7 300 Ω 4W
F2 F.B. 10 AMPS
003A-1000
R1 200 Ω 10W
R2 200 Ω 10W
T3
DS1 NE 51
CR5-CR8 SC4
C2 50 µF 150V
C3 250 µF 150V
CR9 10M56Z10
C4 250 µF 150V
CR10 10M56Z10
R5 1.25K 10W
R3 400 Ω 10W
000-0138
S1
J1
115 V 60 ~
GRD
R10 27K
Q3 2N1545
R8 51Ω 1W
R11 330
R13 180K
R14 33K
Q2 2N1185
R20 3.3K 3W
R21 10K
R23 150K
C7 .001 µF 600V
R24 3K 2W
C8 50 µF 50V
R25 270Ω 3W
OUTPUT VOLTAGE FINE
R26 200 Ω 4W
R27 1K 4W
OUTPUT VOLTAGE COARSE
R31 1.8K
Q6 2N652
Q7 2N652
R33 15Ω 3W
C9 150 µF 50V
C20 100 µF 50V
R32 24K
R34 5K 3W
C6 .022 µF 200V
Q1 2N652
R15 100 Ω
R19 15K
Q4 2N1185
Q5 2N1185
MAX OUTPUT VOLTAGE
CR12 IN2622
R22 4.7K
CR11 SC4
R9 300 Ω
R12 10 Ω
R16 100 Ω 2W
M1 0-15 AMPS
R17 1Ω 50W
R18 0.2Ω 25W
C12 20,000 µF 10V
MAX CURRENT ADJUST
Q10-1 2N1542
R37-1 0.3Ω 2W
003A-2000
Q10-6 2N1542
R37-6 0.3Ω 2W
Q9 2N1542
R29 47K 2W
Q8 2N652
R28 27K 2W
R30 1 MEG
M2 0-40V
C10 5000 µF 50V
C11 50 µF 50V
R35 33Ω
R36 33Ω
J2
J3
J4
J5
J6
J9
J7 - OUTPUT
J8 + OUTPUT
REMOTE SENSING TERMINALS
REMOTE SENSING TERMINALS
GRD
003A-0099
SHEET OF
REV.
3. ALL RESISTORS 1/2 WATT ± 5 %
2 T1, R7, & R27 ARE MECHANICALLY GANGED
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINT OF BEHLMAN-INVAR EQUIP & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.
NOTES: UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON XX ± .010 XXX ± .010 ANGLES ± 30'
FINISH
SURFACE ROUGHNESS FINISH PER MIL-STD-10
DRAWN ED MONROY 6-4-62
CHECKED
ENGINEER 7/18/62
APPROVED 7/18/62
LIST OF MATERIAL
ITEM PART NO. REQ'D DESCRIPTION MATERIAL MAT'L SPEC.
SCHEMATIC TP10
SCALE WEIGHT SIZE D
BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA
003A-0099 A
SHEET OF


REVISIONS
SYM ZONE DESCRIPTION DATE APPROVAL
T1
F1
SB
8 AMPS
T2
CR1-CR4
IN3209
C13
0.1 µF
200 V
C1-1
7000 µF
75 V
C1-2
7000 µF
75 V
R7
300 Ω
4 W
F2
F.8
10 AMPS
Q10-1
2N1542
R37-1
0.3 Ω 2W
Q10-6
2N1542
R37-6
0.3 Ω 2W
003A-2000
Q9
2N1542
R29
4.7 K 2W
Q8
2N652
R28
27 K 2W
R30
1 MEG
003A-1000
R1
200 Ω 10W
R2
200 Ω 10W
DS1
NE 51
T3
CR5-CR8
SC 4
C2
50 µF
150 V
C3
250 µF
150 V
CR9
10M56Z10
BLO
S1
J1
115 V
60 ~
GRD
C4
250 µF
150 V
CR10
10M56Z10
R5
125 K
10W
R3
400 Ω 10W
000-0138
R10
27 K
Q3
2N1545
R8
51 Ω
1W
R11
330 Ω
R13
180 K
R14
33 K
Q2
2N1185
R20
3.3 K
3W
R21
10 K
R23
150 K
C7
.001 µF
600 V
R24
3 K
2W
C8
50 µF
50 V
R25
270 Ω 3W
OUTPUT VOLTAGE FINE
R26
200 Ω
4W
R27
1K 4W
OUTPUT VOLTAGE COARSE
R31
1.8 K
Q7
2N652
Q6
2N652
R33
15 Ω 3W
C9
150 µF
50 V
C20
100 µF
50 V
R32
24 K
R34
5 K 3W
R35
33 Ω
J2
J3
REMOTE SENSING TERMINALS
J7
- OUTPUT
J8
+ OUTPUT
J4
J5
+ REMOTE SENSING TERMINALS
R36
33 Ω
J6
J9
GRD
M2
0-40V
C10
5000 µF
50V
C11
50 µF
50V
C6
.022 µF
200V
Q1
2N652
R15
100 Ω
R19
15 K
Q4
2N1185
Q5
2N1185
MAX OUTPUT VOLTAGE
CR12
IN2622
R22
4.7 K
CR11
SC4
R9
300 Ω
R12
10 Ω
R16
100 Ω 2W
M1
0-15
AMPS
R17
1 Ω
50W
R18
0.2 Ω
25W
C12
20,000 µF
10V
MAX CURRENT ADJUST
3. ALL RESISTORS 1/2 WATT ± 5 %
2 T1, R7, & R27 ARE MECHANICALLY GANGED
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINT OF BEHLMAN-INVAR EQUIP & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.
NOTES: UNLESS OTHERWISE SPECIFIED
DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
XX ± .010
XXX ± .010
ANGLES ± 30'
SURFACE ROUGHNESS FINISH PER MIL-STD-10
ITEM PART NO. REV'D DESCRIPTION MATERIAL MAT'L SPEC.
LIST OF MATERIAL
DRAWN ED MONROY 6-4-62
CHECKED
DESIGNED
ENGINEER 7/18/62
APPROVED 7/18/62
TITLE
SCHEMATIC
TPA-10
BEHLMAN INVAR
ELECTRONICS CORP.
SANTA MONICA CALIFORNIA
DRAWING NO. 003A-0099
SIZE D
003A-0099
SCALE WEIGHT SHEET OF


REVISIONS
SYM. ZONE DESCRIPTION BY DATE APP.
B REDESIGNED & REDRAWN F.L. 6-19-61
C CHANGED PER E.C.O. NO. 279 F.L. 7-20-61
D CHANGED PER E.C.O. NO. 334 D.W. 9-9-61
E CHANGED PER E.C.O. NO. 550 ALV 8-15-62
F CHANGED PER E.C.O. NO. 638 ALV 1-17-63
G CHANGED PER E.C.O. NO. 663 V.I.C. 7-3-63
T1 F1 10 AMP S.B.
T2
T3
F2 15 AMP F.B.
CH CH-2 8000 µF 60V EACH
CR1-CR4 IN1192A
DS1 NE51
R1 200Ω 10W
R2 200Ω 10W
CR5-CR8 SC-4
C2 50 µF 150V
C3 250 µF 150V
CR9 10M56Z10
C4 250 µF 150V
CR10 10M56Z10
R5 1.2K 10W
R3 400Ω 10W
S1
TH
BLOWER
J1
115 V 60~
GRD
R7 300Ω 4W
R10 33K
R8 10Ω 3W
R11 330Ω
R13 180Ω
R14 33K
Q2 2N652
Q3 2N547
R20 3.5K 3W
R21 10K
R23 50K
C7 .001 µF
R24 3K 2W
C8 50 µF 50V
R25 400Ω 3W
OUTPUT VOLTAGE FINE
R26 200Ω 4W
R31 4.7K
Q4 2N652
Q5 2N652
MAXIMUM OUTPUT VOLTAGE
Q6 2N652
Q7 2N652
R27 1K 4W
OUTPUT VOLTAGE COARSE
C9 250 µF 50V
R33 20Ω 3W
R19 15K
CR12 1N2622
R22 4.7K
C6 .04 µF 200V
R15 100Ω
Q1 2N652
CR11 SC-4
R9 1K
R12 18Ω
R16 100Ω 10W
R18-1 .2Ω 25W
R18-2 .2Ω 25W
R7 .5Ω 50W
MAXIMUM CURRENT ADJUST
M1 0-20 AMPS
C12 2000 µF 6V
R32 33K
R34 3W
M2 0-40 VOLTS
C10-1 THRU C10-4 3000 µF 50V EACH
C11 50 µF 50V
R35 33Ω
R36 33Ω
- REMOTE SENSING TERMINALS
+ REMOTE SENSING TERMINALS
- OUTPUT
+ OUTPUT
GRD
Q10-1 2N1547
Q10-12 2N1547
THRU
R37-1 .3Ω 2W
R37-12 .3Ω 2W
Q9 2N547
R29 4.7K
Q8 2N652
R28 33K
R30 220K
DRAWING NO 006-0099
SHEET 1 OF 1
REV. G
3. ALL RESISTORS 1/2 WATT ± 10 %.
2. T1, R7, & R27 ARE MECHANICALLY LINKED.
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINTENANCE OF INVAR EQUIPMENT AND IS NOT TO BE OTHERWISE USED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF THE INVAR ELECTRONICS CORP.
NOTES: UNLESS OTHERWISE SPECIFIED
DRAWN F.J.J. LANG JR. DATE 10-10-60
CHECKED
DESIGN
ENGINEER 4/20/61
APPROVED
TITLE SCHEMATIC TP15
SCALE NONE DWG SIZE D
BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA
DRAWING NO 006-0099 REV. G
CODE SHEET 1 OF


REVISIONS
SYM ZONE DESCRIPTION DATE APP.
A CHANGED PER E.O. NO. 192 6-3-61
B CHANGED PER E.O. NO. 194 & 198 6-6-61
C CHANGED PER E.C.O. NO. 304 8-4-61
D CHANGED PER E.C.O. NO. 419 11-15-61
E CHANGED PER E.C.O. NO. 593 3-27-62
F CHANGED PER E.C.O NO 663 & 921 7-3-62
T1
T2
T3
F1 20 AMP
F2 30 AMP
C1 THRU C6 5000µF EACH 75V
CR1-CR4 1N1184A
DS1 NE51
BI-1 BI-2
S1
J1 115V 60~ GRD
CR5-CR8 SC-4
C2 150µF 150V
C3 150µF 150V
CR9 10M56Z10
C4 250µF 150V
CR10 10M56Z10
R1 200Ω 10W
R2 200Ω 10W
R3 400Ω 10W
R5 1.2K 10W
R7 300Ω 5W
R8 51Ω 1W
R10 33K
R11 330Ω
R13 180K
R14 33K
Q1 2N652
Q2 2N652
Q3 2N1547
Q4 2N652
Q5 2N652
Q6 2N652
Q7 2N652
Q8 2N652
Q9-1&2 2N1547
Q10-1 2N1547
Q10-20 2N1547
R15 100Ω
R17 1000Ω 2W MAXIMUM CURRENT ADJUST
R16 200Ω 2W
R6 200Ω 3W
R18-1 .1Ω 50W
R18-2 1Ω 50W
C12
M1 0-40 AMPS
C6 .02µF 200V
CR11 SC-4
R9 510Ω
R12 10Ω
R19 15K
CR12 IN2622
R20 3.5K 3W
R21 10K
R23 150K
C7 .001µF
R24 2K 2W
C8 50µF 50V
R22 4.7K
R25 250Ω 3W OUTPUT VOLTAGE FINE
R26 200Ω 4W
R27 1K 5W OUTPUT VOLTAGE COARSE
C9 50µF 50V
R28 27K 2W
R29 3K 3W
R30 220K
R31 4.7K
R32 33K
R33 30Ω 3W
R34 5.6K 3W
R35 33Ω
R36 33Ω
R37-1 3Ω 2W
R37-20 3Ω 2W
THRU
M2 0-40 VOLTS
C10-1 THRU C10-6 5000µF EACH 50V
C11 50µF 50V
- REMOTE SENSING TERMINALS
- OUTPUT
+ OUTPUT
+ REMOTE SENSING TERMINALS
GRD
3. ALL RESISTORS 1/2 WATT ± 10 %.
2. T1, R7, & R27 ARE MECHANICALLY LINKED.
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINTENANCE OF INVAR EQUIPMENT AND IS NOT TO BE OTHERWISE USED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF THE INVAR ELECTRONICS CORP
NOTES: UNLESS OTHERWISE SPECIFIED
DRAWN F. J. LANG JR 11-10-60
CHECKED 11-10-60
DESIGN
ENGINEER 11-10-60
APPROVED
TITLE SCHEMATIC TP 30
SCALE NONE
DWG SIZE D
INVAR ELECTRONICS CORP PASADENA, CALIFORNIA
DRAWING NO. 009-0099 REV. F
CODE SHEET 1 OF 1
DRAWING NO. 009-0099
SHEET 1 OF 1
REV. F


REVISIONS
SYM. ZONE DESCRIPTION DATE APP.
A CHANGED PER E.O. NO. 192 6-3-61
B CHANGED PER E.O. NO. 194 & 198 6-6-61
C CHANGED PER E.C.O. NO. 304 8-4-61
D CHANGED PER E C O NO 419 11-15-61
E CHANGED PER E C O NO. 593 3-29-62
F CHANGED PER E C O NO 663 & 721 7-3-62
G CHANGED PER E.C.O. 903 & 941 11-6-62
H ADDED C13, MODEL NO. TPA-30 12-14-62
J CHANGED C13 PER E.C.O. 1274 8-8-63
T1 Q117J-2
T2 009-0050
T3
F1 25 AMP SLO BLO
F2 30 AMP
CR1-CR4 IN1184A
CR5-CR8 SC-4
CR9 10M56Z10
CR10 10M56Z10
CR11 SC-4
CR12 1N2622
CH THRU CH6 5000μF EACH 75V
C1 200V
C2 50μF 150V
C3 250μF 150V
C4 250μF 150V
C6 .02μF 200V
C7 .001μF 500V
C8 50μF 50V
C9 50μF 50V
C10-1 THRU C10-6 5000μF 50V EACH
C11 50μF 50V
C12 2000μF 6V
R1 200Ω 10W
R2 200Ω 10W
R3 400Ω 10W
R5 1.2K 10W
R7 300Ω 5W
R8 51Ω 1W
R9 510Ω
R10 27K
R11 330Ω
R12 10Ω
R13 180K
R14 33K
R15 100Ω
R16 200Ω 2W
R17 2 1000Ω 4W 1
R18 200Ω 3W
R18-1 .12Ω 3% 50W
R18-2 .12Ω 3% 50W
R19 15K
R20 3.3K 3W
R21 10K
R22 4.7K
R23 150K
R24 3K 2W
R25 270Ω 3W
R26 200Ω 4W
R27 1K 5W
R28 27K 2W
R29 3K 3W
R30 220K
R31 1.8K
R32 24K
R33 30Ω 3W
R34 5.6K 3W
R35 33Ω
R36 33Ω
R37-1 3Ω 2W
R37-20 3Ω 2W
Q1 2N652
Q2 2N1185
Q3 2N1545
Q4 2N1185
Q5 2N1185
Q6 2N652
Q7 2N652
Q8 2N652
Q9-12 2N1542
Q10-1 2N1542
Q10-20 2N1542
DS1 NE51
S1
B1-1
B1-2 DPST
J1
M1 0-40 AMPS
M2 0-40 VOLTS
115V 60~
RED
BLACK
YELLOW
MAXIMUM CURRENT ADJUST
MAXIMUM OUTPUT VOLTAGE
OUTPUT VOLTAGE FINE
OUTPUT VOLTAGE COARSE
-REMOTE SENSING TERMINALS
-OUTPUT
+OUTPUT
+REMOTE SENSING TERMINALS
GRD
THRU
3. ALL RESISTORS 1/2 WATT ± 5 %.
2. T1, R7, & R27 ARE MECHANICALLY LINKED.
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINTENANCE OF INVAR EQUIPMENT AND IS NOT TO BE OTHERWISE USED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF BEHLMAN INVAR ELECTRONICS CORP.
NOTES: UNLESS OTHERWISE SPECIFIED
DRAWN F.J.J. LANG JR 11-10-60
CHECKED
DESIGN 11-10-60
ENGINEER
APPROVED
TITLE SCHEMATIC TPA-30
BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA
DRAWING NO. 009A0099 REV. J
SCALE NONE
DWG SIZE D
CODE
SHEET 1 OF 1
DRAWING NO. 009A0099
SHEET 1 OF 1
REV J




| REVISIONS | | | | |
|---|---|---|---|---|
| SYM. | ZONE | DESCRIPTION | DATE | APPROVAL |
| A | | REVISED AND REDRAWN, CHANGE EFF. ON SERIAL NO. UNITS PRODUCED AFTER 10-5-62 | | |

3. ALL RESISTORS 1/2 WATT ± 5 %
2. T1, R7, & R27 ARE MECHANICALLY GANGED
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINT. OF BEHLMAN-INVAR EQUIP. & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.

NOTES: UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

| ITEM | PART NO. | REQ'D | DESCRIPTION | MATERIAL | MAT'L SPEC. |
|---|---|---|---|---|---|

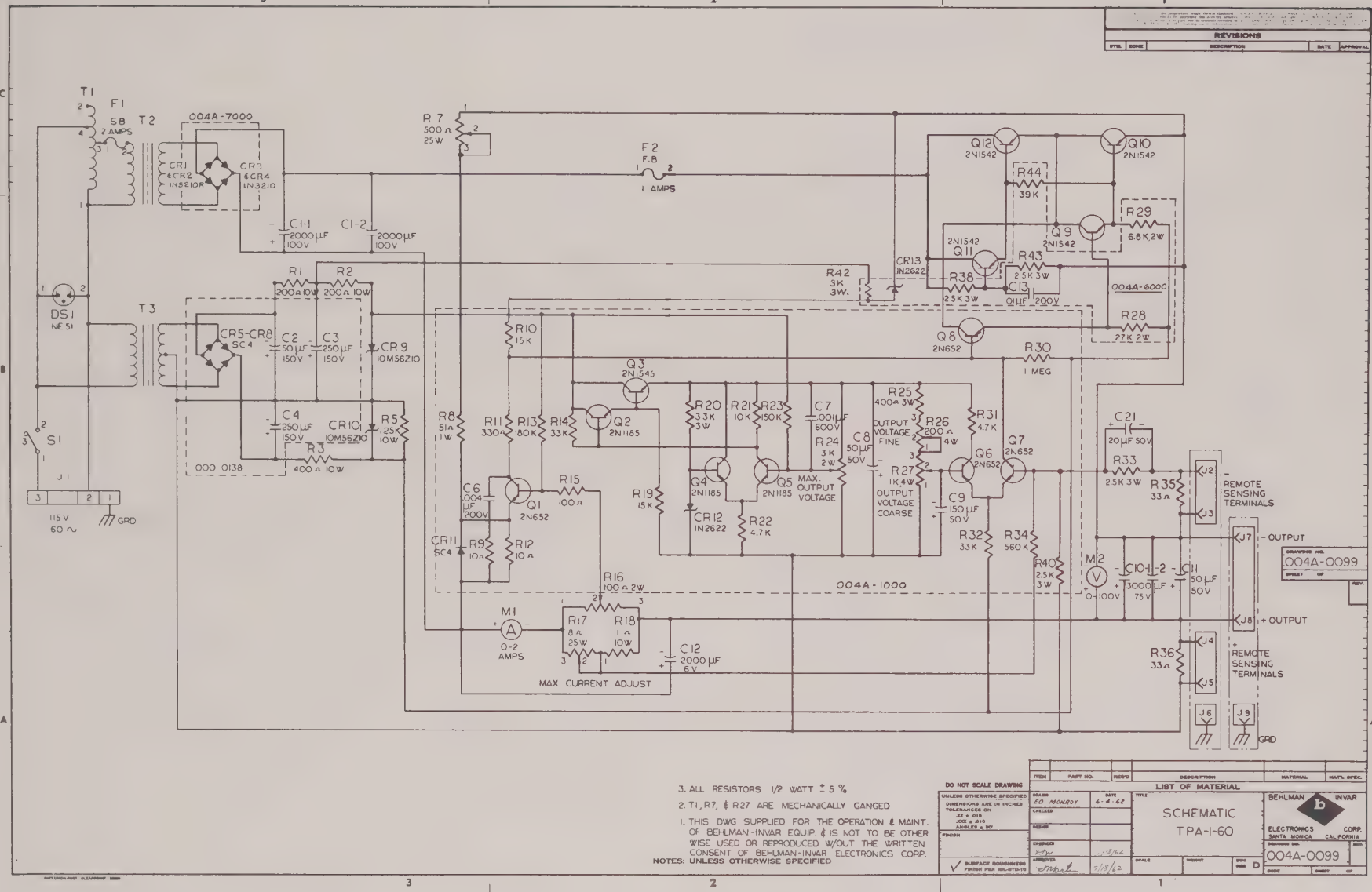
LIST OF MATERIAL

| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON .XX ± .010 .XXX ± .010 ANGLES ± 30' FINISH | DRAWN EO MONROY | DATE 6-6-62 | TITLE SCHEMATIC TP 1-60 |
| | CHECKED | | |
| | ENGR | | |
| | MFG | 7/18/62 | |
| ✓ SURFACE ROUGHNESS FINISH PER MIL-STD-10 | APPROVED | 7/18/62 | SIZE D |

BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA

DRAWING NO. 004A-0099 A

SCALE WEIGHT SHEET OF




3. ALL RESISTORS 1/2 WATT ± 5 %

2. T1, R7, & R27 ARE MECHANICALLY GANGED

1. THIS DWG SUPPLIED FOR THE OPERATION & MAINT. OF BEHLMAN-INVAR EQUIP. & IS NOT TO BE OTHER WISE USED OR REPRODUCED W/OUT THE WRITTEN CONSENT OF BEHLMAN-INVAR ELECTRONICS CORP.

NOTES: UNLESS OTHERWISE SPECIFIED

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON .XX ± .015 .XXX ± .010 ANGLES ± 30'

FINISH

SURFACE ROUGHNESS FINISH PER MIL-STD-10

| ITEM | PART NO. | REQ'D | DESCRIPTION | MATERIAL | MAT'L SPEC. |
|---|---|---|---|---|---|

LIST OF MATERIAL

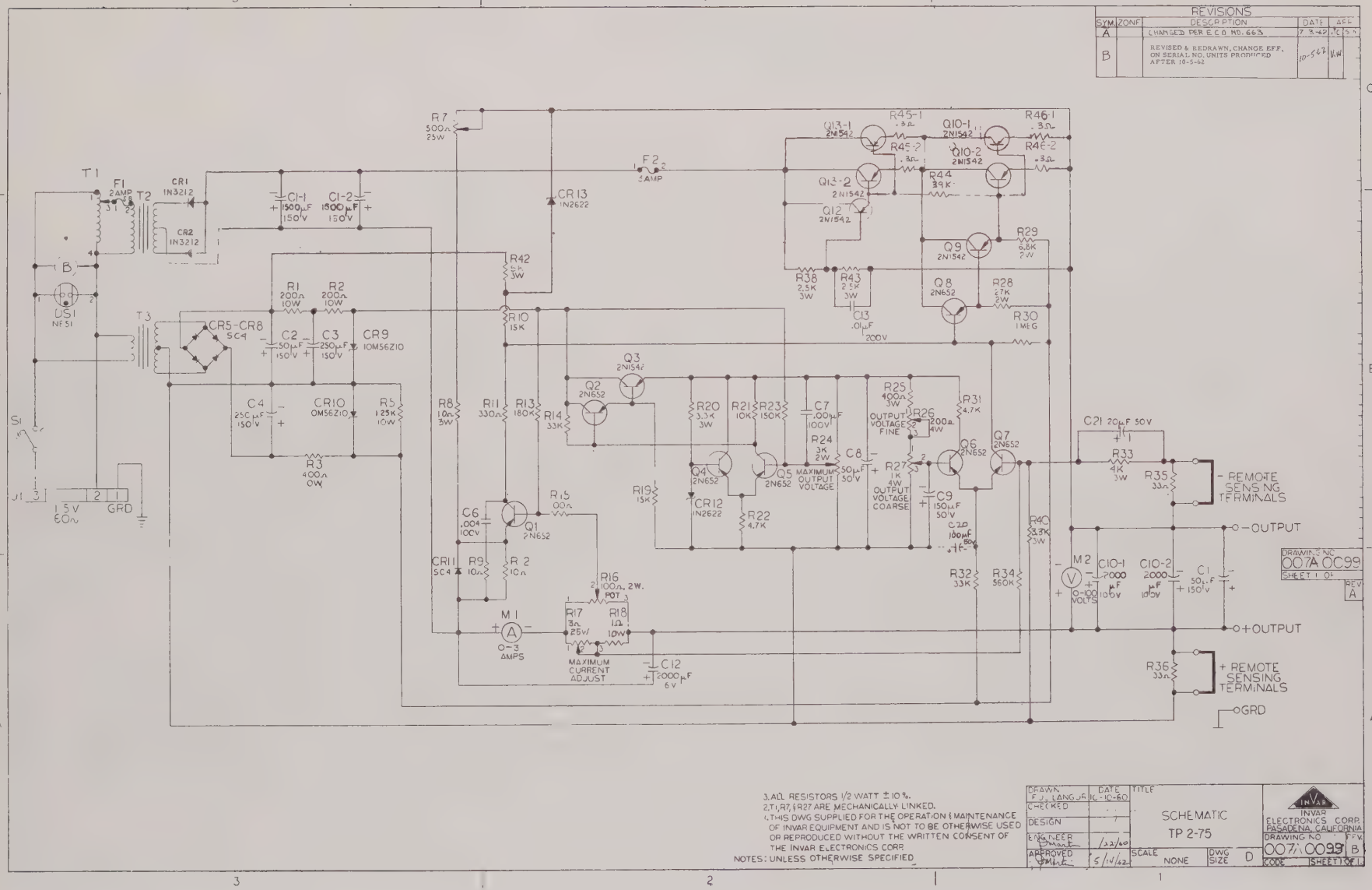
| | | |
|---|---|---|
| DRAWN | ED MONROY | DATE 6-4-62 |
| CHECKED | | |
| DESIGNED | | |
| ENGINEER | | 7/3/62 |
| APPROVED | | 7/3/62 |

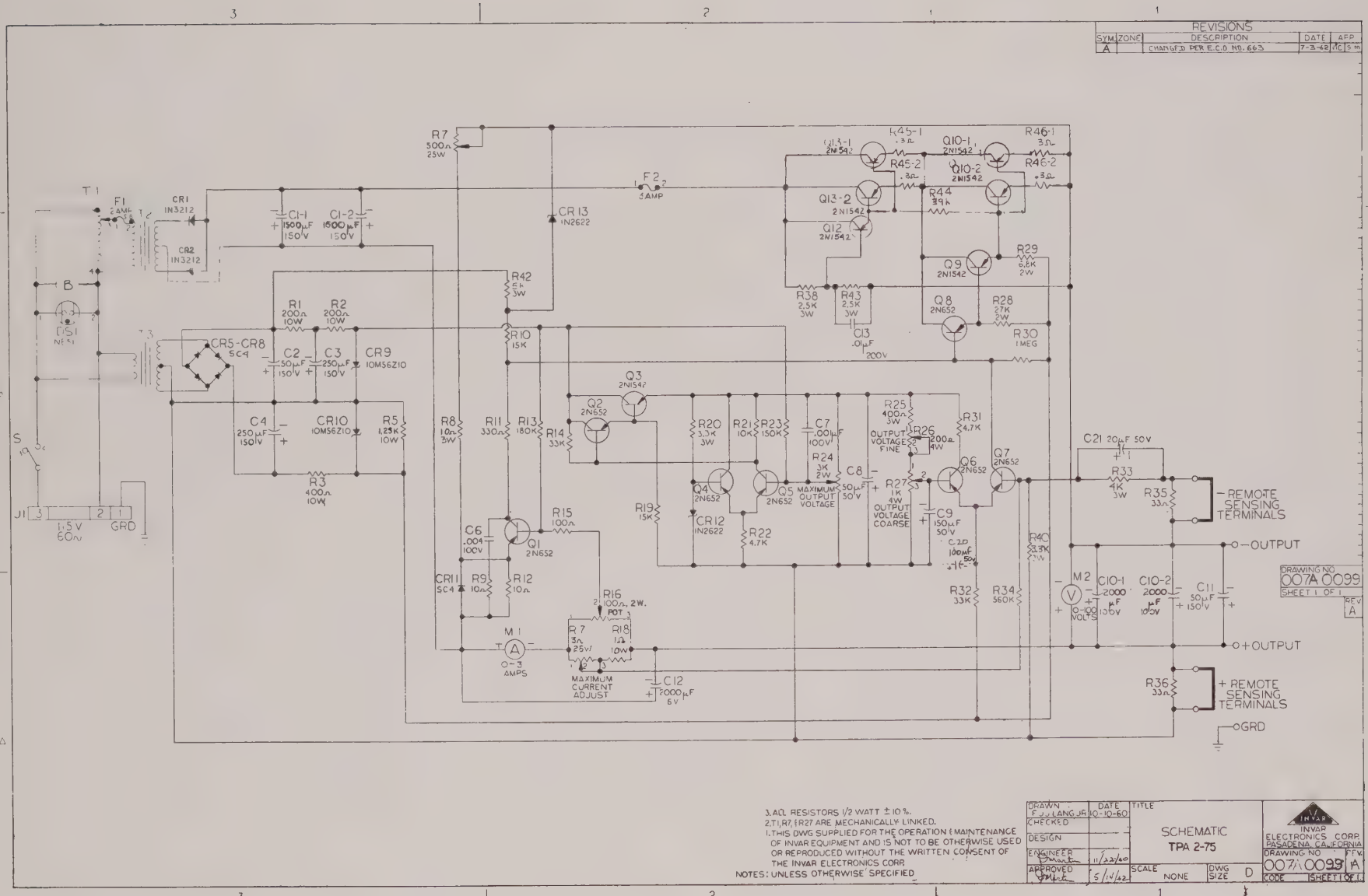
TITLE: SCHEMATIC TPA-I-60

BEHLMAN INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA

DRAWING NO. 004A-0099

SCALE — WEIGHT — SIZE D

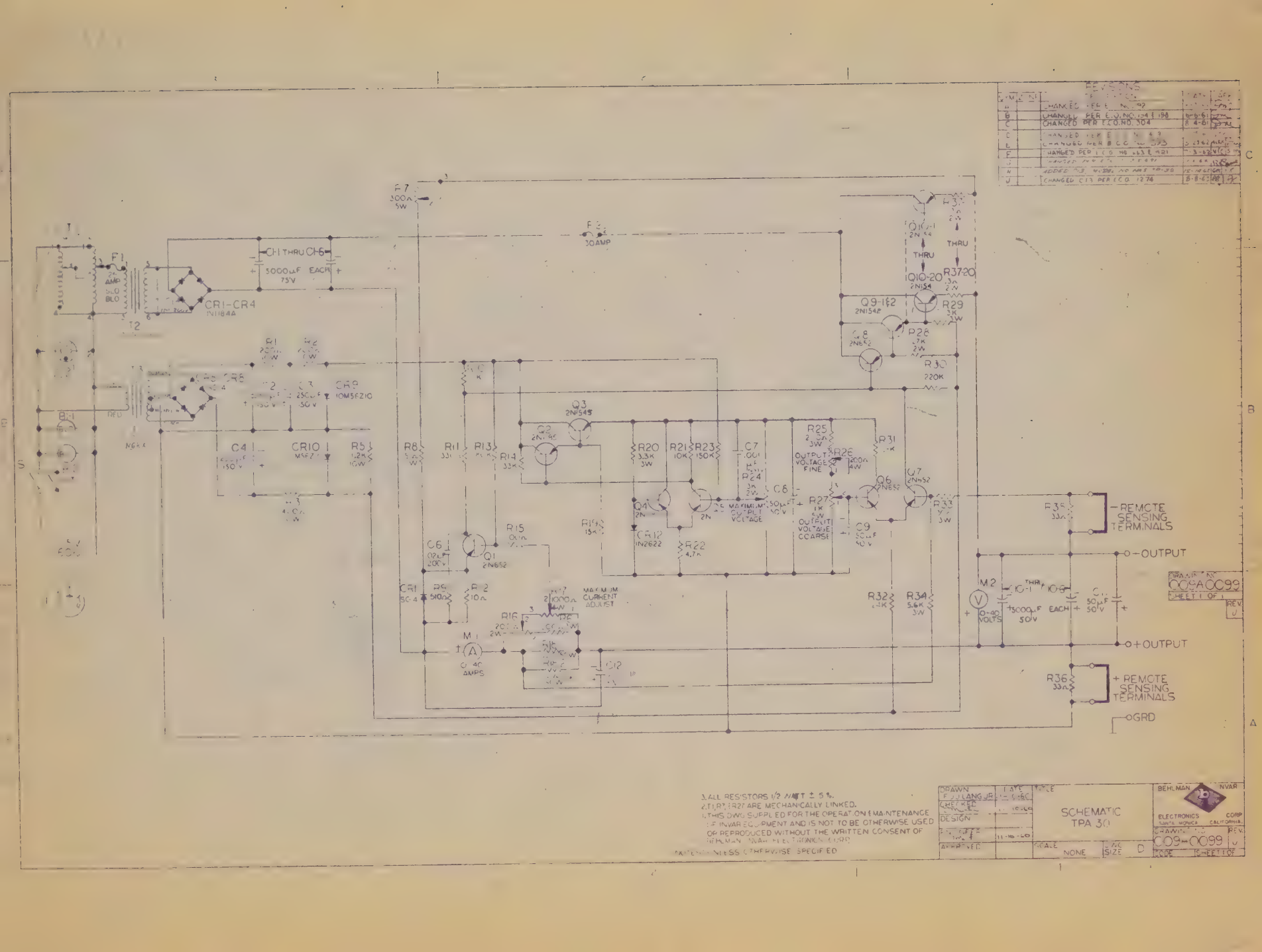

REVISIONS
SYM ZONE DESCRIPTION DATE APP
A CHANGED PER E.C.O. NO. 663 7-3-62 J.C.S.
B REVISED & REDRAWN, CHANGE EFF. ON SERIAL NO. UNITS PRODUCED AFTER 10-5-62 10-5-62 J.W.
T1
F1 2AMP
T2
CR1 1N3212
CR2 1N3212
C1-1 1500μF 150V
C1-2 1500μF 150V
DS1 NE51
T3
CR5-CR8 SC4
C2 250μF 150V
C3 250μF 150V
CR9 10M56Z10
C4 250μF 150V
CR10 0M56Z10
R5 125K 10W
R3 400Ω 0W
S1
J1
1.5V 60Ω
GRD
R1 200Ω 10W
R2 200Ω 10W
R42 5K 3W
R7 500Ω 25W
F2 3AMP
CR13 1N2622
R10 15K
R8 10Ω 3W
R11 330Ω
R13 180K
R14 33K
Q3 2N1542
Q2 2N652
R20 3.3K 3W
R21 10K
R23 150K
C7 .001μF 100V
R25 400Ω 3W OUTPUT VOLTAGE FINE
R26 200Ω 4W
R31 4.7K
R24 3K 2W
C8 50μF 50V
MAXIMUM OUTPUT VOLTAGE
R27 1K 4W OUTPUT VOLTAGE COARSE
C9 150μF 50V
C20 100μF 50V
Q4 2N652
Q5 2N652
Q6 2N652
Q7 2N652
CR12 1N2622
R22 4.7K
R19 15K
R15 100Ω
C6 .004 100V
Q1 2N652
CR11 SC4
R9 10Ω
R2 10Ω
R16 100Ω, 2W. POT
R17 3Ω 25W
R18 12Ω 10W
MAXIMUM CURRENT ADJUST
M1 0-3 AMPS
C12 2000μF 6V
Q13-1 2N1542
R45-1 .3Ω
Q10-1 2N1542
R46-1 .3Ω
R45-2 .3Ω
Q10-2 2N1542
R46-2 .3Ω
Q13-2 2N1542
R44 39K
Q12 2N1542
R29 0.8K 2W
Q9 2N1542
R38 2.5K 3W
R43 2.5K 3W
C13 .01μF 200V
Q8 2N652
R28 27K 2W
R30 1MEG
C21 20μF 50V
R33 4K 3W
R35 33Ω
R40 3.3K 3W
R32 33K
R34 560K
M2 0-100 VOLTS
C10-1 7000 μF 10V
C10-2 2000 μF 10V
C1 50μF 150V
- REMOTE SENSING TERMINALS
-OUTPUT
+OUTPUT
+ REMOTE SENSING TERMINALS
R36 33Ω
GRD
DRAWING NO 007A 0099
SHEET 1 OF
REV A
3. ALL RESISTORS 1/2 WATT ± 10%.
2. T1, R7, & R27 ARE MECHANICALLY LINKED.
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINTENANCE OF INVAR EQUIPMENT AND IS NOT TO BE OTHERWISE USED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF THE INVAR ELECTRONICS CORP.
NOTES: UNLESS OTHERWISE SPECIFIED
DRAWN F.J. LANG JR
CHECKED
DESIGN
ENGINEER
APPROVED
DATE 10-10-60
1/22/62
5/14/62
TITLE SCHEMATIC TP 2-75
SCALE NONE
DWG SIZE D
INVAR ELECTRONICS CORP. PASADENA, CALIFORNIA
DRAWING NO 007A 0099 B
CODE SHEET 1 OF 1




1. ALL RESISTORS 1/2 WATT ± 10%.
2. T1, R7, & R27 ARE MECHANICALLY LINKED.
1. THIS DWG SUPPLIED FOR THE OPERATION & MAINTENANCE OF INVAR EQUIPMENT AND IS NOT TO BE OTHERWISE USED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF THE INVAR ELECTRONICS CORP.

NOTES: UNLESS OTHERWISE SPECIFIED

| | | | |
|---|---|---|---|
| DRAWN F. J. LANGJAR | DATE 10-10-60 | TITLE SCHEMATIC TPA 2-75 | INVAR ELECTRONICS CORP. PASADENA, CALIFORNIA |
| CHECKED | | | DRAWING NO 007A 0099 REV A |
| DESIGN | | | |
| ENGINEER | 11/22/60 | | |
| APPROVED | 5/14/62 | SCALE NONE | DWG SIZE D |
| | | | CODE SHEET 1 OF 1 |


REVISIONS
MANUFACTURER'S NO.
MANUALLY PER E.O. NO. 194 & 198
CHANGED PER E.C.O. NO. 504
CHANGED PER E.C.O. NO. 595
CHANGED PER E.C.O. NO. 663 & 921
ADDED C13 PER E.C.O. 1276
F1 2A SLO BLO
T2
CR1-CR4 IN1184A
C1 THRU C6 5000uF EACH 75V
F2 30AMP
F3 300A 5W
T3
CR5 CR6 CR7 CR8 IN1544
C2 150uF 50V
C3 250uF 50V
CR9 10M5EZ10
R1 200 2W
R2 200 2W
RED
BLK
C4 150uF
CR10 M5EZ7
R5 1.2K 10W
4.0A
R8 5.6K 5W
R11 33K
R13
R14 33K
R15 0.1A
C6 .02uF 200V
CR11 SC-4
R9 510A
R12 10A
R16 20K 2W
M1 0-40 AMPS
MAXIMUM CURRENT ADJUST
C12 .1
Q1 2N652
Q2 2N1545
Q3 2N1545
Q4 2N
R19 15K
CR12 1N2622
R20 3.3K 3W
R21 10K
R23 150K
C7 .001uF
R24 3K 2W
C8 50uF 50V
R22 4.7K
R25 2K 3W
OUTPUT VOLTAGE FINE
R26 100A 4W
R27 1K 5W OUTPUT VOLTAGE COARSE
C9 50uF 50V
Q6 2N652
U7 2N652
R31
R33 3K 3W
Q11-1 2N1541
THRU
Q10-20 2N1541
R32 3.3K 2W
R29 3K 3W
Q9-12 2N1542
Q8 2N652
R28 7K 2W
R30 220K
R32 4.7K
R34 5.6K 3W
R35 33A
R36 33A
M2 0-80 VOLTS
C10-1 THRU C10-8 5000uF EACH 50V
C11 50uF 50V
-REMOTE SENSING TERMINALS
-OUTPUT
+OUTPUT
+REMOTE SENSING TERMINALS
GRD
DRAWING NO. CC-A0099
SHEET 1 OF 1
REV. U
3. ALL RESISTORS 1/2 WATT ± 5%.
4. R1, R2, R27 ARE MECHANICALLY LINKED.
5. THIS DWG. SUPPLIED FOR THE OPERATION & MAINTENANCE OF INVAR EQUIPMENT AND IS NOT TO BE OTHERWISE USED OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF BEHLMAN INVAR ELECTRONICS CORP.
UNLESS OTHERWISE SPECIFIED
DRAWN F. J. LANGJR 1-6-60
CHECKED
DESIGN 10-26-60
APPROVED 11-10-60
SCHEMATIC TPA 30
SCALE NONE
SIZE D
BEHLMAN INVAR ELECTRONICS CORP SANTA MONICA CALIFORNIA
DRAWING NO. CC9-0099
REV. U
CODE
SHEET 1 OF 1

# ENGINEERING ORDER

☐ CHANGE ☒ DEVIATION ☐ STOP ORDER

BEHLMAN-INVAR ELECTRONICS CORP. SANTA MONICA, CALIFORNIA

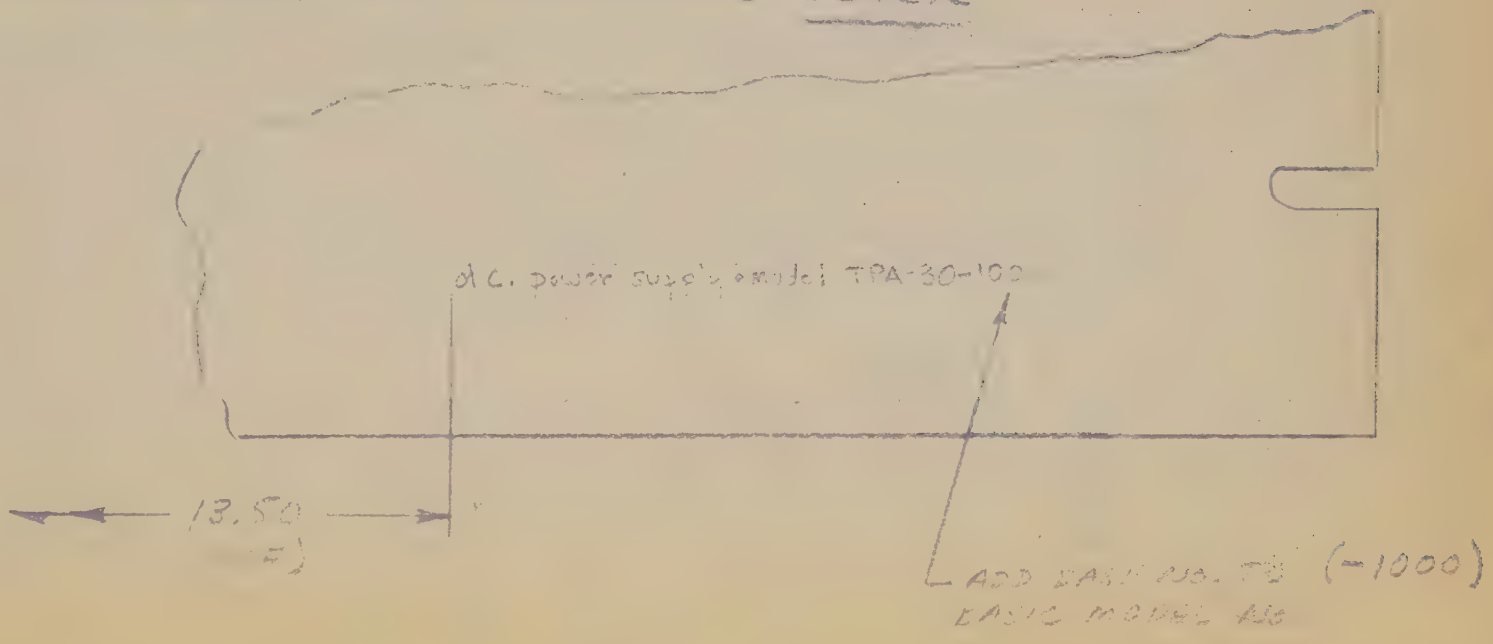
| | | | |
|---|---|---|---|
| Model No. TPA-30-100 | Dwg. No. 6614-5001 | E.O. No. M-5 | |
| Dwg. Title FRONT PANEL | Job No. 63,102 | Sht. 1 of 1 | |
| Manual or P.P.B. affected Yes / No | Requested By [illegible] | Date 7/16/65 | |

| REASON FOR CHANGE ORDER | DISPOSITION OF PARTS | | | | DEPARTMENTAL SIGNATURES | |
|---|---|---|---|---|---|---|
| | Status | In Process | In Stock | In Assy. | | |
| ☐ Drafting Error | | | | | Cognizant Eng. | |
| ☐ Mfg. Error | Use as is | | | | Design Eng. | Drawn [illegible] |
| ☐ Design Error | Rework | | | | Co-ord Eng. | Checked |
| ☐ Redesign | Scrap | | | | Prod. Control | Cognizant Eng. |
| ☐ Customer Request | Other | | | | Publications | Final Approval [illegible] |
| ☐ Other | Effectivity | | Serial No. | | Purchasing | |
| ☐ Parts List | | | From To | | Quality Control | |

DESCRIPTION OF CHANGE

PAINT PANEL FED-STD-595 COLOR # 26440

SILKSCREEN ALL CHARACTERS BLACK



# ENGINEERING ORDER

☐ CHANGE ☒ DEVIATION ☐ STOP ORDER

BEHLMAN-INVAR ELECTRONICS CORP. SANTA MONICA, CALIFORNIA

Model No. [illegible] Dwg No. [illegible] E.O. No. [illegible]

Dwg. Title [illegible] Job No. [illegible] Sht. 1 of 1

Manual or P.P.B. affected Yes No Requested By [illegible] Date 7/[illegible]/63

| REASON FOR CHANGE ORDER | DISPOSITION OF PARTS | | | | DEPARTMENTAL SIGNATURES | |
|---|---|---|---|---|---|---|
| Drafting Error | Status | In Process | In Stock | In Assy. | Cognizant Eng. | |
| Mfg. Error | Use as is | | | | Design Eng. | Drawn [illegible] |
| Design Error | Rework | | | | Co-ord Eng. | Checked |
| Redesign | Scrap | | | | Prod. Control | Cognizant Eng. |
| Customer Request | Other | | | | Publications | Final Approval [illegible] |
| Other | Effectivity | | Serial No. | | Purchasing | |
| Parts List | | | From To | | Quality Control | |

DESCRIPTION OF CHANGE

DELETE ITEM 36 (HANDLES)

IS NOW

ITEM 36 MS-17277 [illegible] P/N - ES 3716 HANDLES

# ENGINEERING ORDER

☒ CHANGE ☐ DEVIATION ☐ STOP ORDER

REHLMAN-INVAR ELECTRONICS CORP. SANTA MONICA CALIFORNIA

Model No. TP-3-12, TPA-303 | Dwg. No. 009F-6000 | E.O. No. 211-3

Dwg. Title M A ASSY PARTS LIST | Job No.

Manufactured (Yes) No | Prepared By [illegible] | Sht 1 of 1

REASON FOR CHANGE

- ☐ Drafting Error
- ☐ Mfg. Error
- ☐ Design Error
- ☐ Redesign
- ☐ Customer request
- ☑ Other *
- ☐ Parts List

DISPOSITION OF PARTS

| Status | In Process | In Stock | In Assy |
|---|---|---|---|
| Use as is | ✓ | ✓ | ✓ |
| Rework | | | |
| Scrap | | | |
| Other | | | |
| Effectivity | | | |

Serial No. From To

DEPARTMENTAL SIGNATURES

| | |
|---|---|
| Cognizant Eng. | |
| Design Eng. | |
| Co-ord Eng. | [illegible] |
| Prod. Control | |
| Publications | |
| Purchasing | |
| Quality Control | |

Drawn

Checked

Cognizant Eng.

Final Approval [illegible]

DESCRIPTION OF CHANGE

MANDATORY

RECORDS CHANGE ONLY

DELETE

ROTRON RE-122 FAN, VENTURI MUFFIN QTY. 2.

ADD

ROTRON 22-244-6501 FAN, VENTURI MUFFIN QTY. 2

* REASON: MFGR. HAS ASSIGNED PART NO. FOR FIRST TIME (RE-122 WAS NOT A PART NO.)

SEP 23 1964

81-102

| REV. | ITEM NO. | DATE | DESCRIPTION | APPROVAL |
|---|---|---|---|---|
| | 112, 113 | 12-19-62 | Added these two items. | |
| 1221 | 114 | 4-23-63 | Added this item per ECO-1221. | |
| 1274 | 37 | 6-14-63 | C13 was.1 mfd, changed per ECO-1274. | |
| 1269 | 115 | 12-18 63 | Added per ECO-1269. | |
| 2113 | 33 | 9-26-64 | P/N was RE-122. Changed per ECO-2113. | |

| | | | BEHLMAN-INVAR ELECTRONICS CORP. | Number |
|---|---|---|---|---|
| Approved | | | PARTS LIST | 009-0000 |
| Checked | | | MODEL TPA-30 | |
| Prepared | | | TITLE Main Assembly | Sheet 1 of 19 |

BEC-21

BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | REF. | | | | | | | | | | | | | 000-0138 | PC Board No. 3 Assembly | | | | | |
| | REF. | | | | | | | | | | | | | 000-0105 | Diode Heatsink Assembly | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE

SHEET OF

# BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ref. | | | | | | | | | | 009-0000 | Main Assembly | | | | | |
| 1 | | K | | 1 | | | | | | | | | | 009-0001 Sheets 1 and 2 | Detail and Markings, Front Panel | | | | | |
| 2 | | K | | 1 | | | | | | | | | | 009-0002 | Chassis | | | | | |
| 3 | | K | | 1 | | | | | | | | | | 009-0003 | Stiffener, Chassis | | | | | |
| 4 | | K | | 1 | | | | | | | | | | 009-0004 | Side, Left | | | | | |
| 5 | | K | | 1 | | | | | | | | | | 009-0005 | Side, Right | | | | | |
| 6 | | K | | 1 | | | | | | | | | | 009-0006 Sheets 1 and 2 | Detail and Markings, Rear Side | | | | | |
| 7 | | K | | 1 | | | | | | | | | | 009-0007 | Mechanical Mounting, Cover | | | | | |
| 8 | | K | | 1 | | | | | | | | | | 006-0008 | Perferation, Cover | | | | | |
| 9 | | K | | 1 | | | | | | | | | | 009-0009 | Bracket, Fan Mounting | | | | | |
| 10 | | K | | 1 | | | | | | | | | | 009-0010 | Bracket, Front Variac | | | | | |
| 11 | | K | | 1 | | | | | | | | | | 009-0011 | Bracket, Rear Variac | | | | | |
| 12 | | K | | 1 | | | | | | | | | | 009-0012 | Plate, Heatsink | | | | | |
| 13 | | K | | 5 | | | | | | | | | | 009-0013 | Detail, 4 Transistor Heatsink | | | | | |
| 14 | | K | | 4 | | | | | | | | | | 009-0014 | Jumper, Capacitor | | | | | |
| 15 | | K | | 2 | | | | | | | | | | 009-0015 | Jumper, Capacitor | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE

| ITEM NO. | REF. NO. | MFR. CODE | I. D. | QUANTITY PER ASSEMBLY 0 -1 -2 -3 -4 -5 -6 -7 -8 -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | | K | | 1 | 009-0016-1 | Insulation, Capacitor Jumper | | | | | |
| 17 | | K | | 1 | 009-0016-2 | Insulation, Capacitor Jumper | | | | | |
| 18 | | K | | 4 | 009-0017 | Spacer, Variac | | | | | |
| 19 | | K | | 3 | 009-0018 | Spacer, PC Board No. 1 | | | | | |
| 20 | | K | | 2 | 009-0019 | Spacer, Cover | | | | | |
| 21 | | K | | 2 | 009-0020 | Plate, Extension | | | | | |
| 22 | | K | | 1 | 009-0400 | Assembly, TB 4 | | | | | |
| 23 | | K | | 1 | 009-0500 | Assembly, Rectifier Stack | | | | | |
| 24 | | K | | 1 | 009-1000 | Assembly, Heatsink PC Board No. 2 | | | | | |
| 25 | | K | | 1 | 000-0069-A | Gear, Chain | | | | | |
| 26 | | K | | 2 | 000-0069-B | Gear, Chain | | | | | |
| 27 | | K | | 3 | 000-0070 | Bushing, Chain Gear | | | | | |
| 28 | | K | | 1 | 000-0121 | Bracket, Diode Heatsink Mounting | | | | | |
| 29 | | K | | 1 | 000-0138 | Assembly, PC Board No. 3 | | | | | |
| 30 | | K | | 1 | 000-0105 | Assembly, Diode Heatsink | | | | | |
| 31 | | K | | 1 | 009-0600 | Assembly, PC Board No. 1 | | | | | |
| 32 | | K | | 1 | 000-0111 | Filter, Blower | | | | | |

COMPILED BY: W. A Rodgers DATE 7-9-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | | DQ | | 2 | | | | | | | | | | 20-244-6501 | Fan, Muffin Ventrui | | | | | |
| 34 | | KK | | 4 | | | | | | | | | | 7269634 | Insulator, Heatsink | | | | | |
| 35 | | CK | | 2 | | | | | | | | | | 217-1044P4 | Bracket, PC Board Mounting | | | | | |
| 36 | | JY | | 2 | | | | | | | | | | 22-20 | Handle | | | | | |
| 37 | C13 | B | | 1 | | | | | | | | | | P323SP | Capacitor, 1 µfd, 200 V Fixed Metalized Paper Tubular | | | | | |
| 38 | | AY | | 6 | | | | | | | | | | 29-3B | Binding Post, Black | | | | | |
| 39 | | AY | | 4 | | | | | | | | | | 29-3R | Binding Post, Red | | | | | |
| 40 | | AY | | 2 | | | | | | | | | | 29B11-1 | Base, Dual | | | | | |
| 41 | XF2 | BP | | 1 | | | | | | | | | | 342006 | Fuse Post Extrac tor | | | | | |
| 42 | XF1 | BP | | 1 | | | | | | | | | | 342004 | Fuse Post, Extractor | | | | | |
| 43 | | FD | | 3 | | | | | | | | | | 653 | Hole Plug, Snap Buttot | | | | | |
| 44 | | FD | | 1 | | | | | | | | | | 652 | Hole Plug, Snap Button | | | | | |
| 45 | | BX | | 2 | | | | | | | | | | KMS-22N2S | Knob | | | | | |
| 46 | | CK | | 1 | | | | | | | | | | 125-1-2 | Knob | | | | | |
| 47 | | LH | | A/R | | | | | | | | | | 1A | Chain, Brass Ladder | | | | | |
| 48 | | DG | | 1 | | | | | | | | | | 3316A | Coupling, Shaft | | | | | |
| 49 | XDS1 | AJ | | 1 | | | | | | | | | | 95408-933 | Pilot Light Assembly | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | DS1 | AV | | 1 | | | | | | | | | | NE-51H | Lamp, Neon | | | | | |
| 51 | J1 | BD | | 1 | | | | | | | | | | 7556 | Connector, Male Receptacle | | | | | |
| 52 | | CL | | 6 | | | | | | | | | | B2-2-1/2" I. D. | Ring, Capacitor Mounting | | | | | |
| 53 | | CL | | 6 | | | | | | | | | | B2-2" I. D. | Ring, Capacitor, Mounting | | | | | |
| 54 | C1-1 thru C1-6 | MU | | 6 | | | | | | | | | | NV75C50 | Capacitor, 5000 µfd, 75 vdc, Fixed Electrolytic | | | | | |
| 55 | C10-1 thru C10-6 | MU | | 6 | | | | | | | | | | NV50J50 | Capacitor, 5000 µfd, 50 vdc, Fixed Electrolytic | | | | | |
| 56 | T2 | AG | | 1 | | | | | | | | | | 009-0050 | Transformer | | | | | |
| 57 | T3 | DA | | 1 | | | | | | | | | | N68X | Transformer | | | | | |
| 58 | M1 | K | | 1 | | | | | | | | | | 2500006-7 | Ammeter, 0-40A | | | | | |
| 59 | M2 | K | | 1 | | | | | | | | | | 3002269-9 | Voltmeter, 0--40 vdc, | | | | | |
| 60 | S1 | AC | | 1 | | | | | | | | | | 7402K4 | Switch, DPST Toggle | | | | | |
| 61 | T1 | CS | | 1 | | | | | | | | | | Q117U-2 | Powerstat | | | | | |
| 62 | R18-R18-2 | AH | | 2 | | | | | | | | | | RH 50 | Resistor, 0.1 ohm, 50W, 3%, Fixed Wire-Wound | | | | | |
| 63 | | KT | | 1 | | | | | | | | | | CL 14IN-10 | Clamp, Support | | | | | |

COMPILED BY: W. A Rodgers DATE 7-9-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 64 | R17 | Z | | 1 | | | | | | | | | | A10-1K | Potentiometer, 1K ohms, 4W Wire-Wound | | | | | |
| 65 | C11 | AB | | 1 | | | | | | | | | | BR50-50 | Capacitor, 50 µfd, 50 vdc, Fixed Electrolytic Tubular | | | | | |
| 66 | R1, R2 | BY | | 2 | | | | | | | | | | F116 | Resistor, 200 ohms, 10W, Fixed Wire-Wound | | | | | |
| 67 | R3 | BY | | 1 | | | | | | | | | | F119 | Resistor, 400 ohms, 10W, Fixed Wire-Wound | | | | | |
| 68 | R5 | BY | | 1 | | | | | | | | | | F124 | Resistor, 1.25K ohms, 10W, Fixed Wire-Wound | | | | | |
| 69 | | | | 4 | | | | | | | | | | | Screw, 3/8-24x7/16 Cad. Pl. Stl. Hex Head | | | | | |
| 70 | | | | 4 | | | | | | | | | | | Washer, 3/8 Cad. Pl. Stl. Flat | | | | | |
| 71 | | | | 4 | | | | | | | | | | | Screw, 1/4-28x11/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 72 | | | | 4 | | | | | | | | | | | Washer, 1/4 Cad. Pl. Stl. Flat | | | | | |
| 73 | | | | 4 | | | | | | | | | | | Screw, 1/4-28x1-1/2 Cad. Pl. Stl. Hex Head | | | | | |
| 74 | | | | 4 | | | | | | | | | | | Washer, 1/4 Cad. Pl. Stl. Splitlock | | | | | |
| 75 | | | | 34 | | | | | | | | | | | Screw, 10-32x3/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 76 | | | | 54 | | | | | | | | | | | Washer, No. 10 Cad. Pl. Stl. Flat | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 77 | | | | 24 | | | | | | | | | | | Washer, No. 10 Cad. Pl. Stl. Splitlock | | | | | |
| 78 | | | | 24 | | | | | | | | | | | Nut, 10-32 Cad. Pl. Stl. Hex | | | | | |
| 79 | | | | 1 | | | | | | | | | | | Screw, 8-32x3/4 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 80 | | | | 5 | | | | | | | | | | | Screw, 8-32x5/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 81 | | | | 3 | | | | | | | | | | | Screw, 8-32x9/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 82 | | | | 4 | | | | | | | | | | | Screw, 8-32x7/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 83 | | | | 13 | | | | | | | | | | | Screw, 8-32x3/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 84 | | | | 11 | | | | | | | | | | | Screw, 8-32x5/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 85 | | | | 4 | | | | | | | | | | | Screw, 8-32x1/4 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 86 | | | | 59 | | | | | | | | | | | Washer, No. 8 Cad. Pl. Stl. Flat | | | | | |
| 87 | | | | 18 | | | | | | | | | | | Washer, No. 8 Cad. Pl. Stl. Splitlock | | | | | |
| 88 | | | | 18 | | | | | | | | | | | Nut, 8-32 Cad. Pl. Stl. Hex | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE

# BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 89 | | KR | | 4 | | | | | | | | | | 46 | Lug, Solder with 0.169 Hole Size | | | | | |
| 90 | | | | 4 | | | | | | | | | | | Screw, 6-32x7/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 91 | | | | 4 | | | | | | | | | | | Screw, 6-32x1/2 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 92 | | | | 8 | | | | | | | | | | | Screw, 6-32x3/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 93 | | | | 2 | | | | | | | | | | | Screw, 6-32x5/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 94 | | | | 28 | | | | | | | | | | | Screw, 6-32x1/4 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 95 | | | | 4 | | | | | | | | | | | Screw, 6-32x5/8 Cad. Pl. Stl. Phillips Recessed 100° Flathead | | | | | |
| 96 | | | | 54 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Flat | | | | | |
| 97 | | | | 12 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Splitlock | | | | | |
| 98 | | | | 12 | | | | | | | | | | | Nut, 6-32 Cad. Pl. Stl. Hex | | | | | |
| 99 | | | | 2 | | | | | | | | | | | Screw, 4-40x1-5/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 100 | | | | 4 | | | | | | | | | | | Screw, 4-40x1/4 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE



8171

# BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 101 | | | | 6 | | | | | | | | | | | Washer, No. 4 Cad. Pl. Stl. Flat | | | | | |
| 102 | | W | | 1 | | | | | | | | | | 2006 | Terminal Strip | | | | | |
| 103 | | KT | | 1 | | | | | | | | | | CL141N-6 | Clamp, Support | | | | | |
| 104 | | | | 6 | | | | | | | | | | | Rod, 1/4-28 Cad. Pl. Brass Threaded, Length A/R | | | | | |
| 105 | | KU | | 1 | | | | | | | | | | CGB | Cap, Knob | | | | | |
| 106 | | K | | 1 | | | | | | | | | | 000-0277 | Plate, Name and Serial Number | | | | | |
| 107 | F1 | BP | | 1 | | | | | | | | | | 313025 | Fuse, 25 Amp SB | | | | | |
| 108 | F2 | BP | | 1 | | | | | | | | | | 314030 | Fuse, 30 Amp, 125V, Quick Acting | | | | | |
| 109 | R7 | T | | 1 | | | | | | | | | | WW 301 | Potentiometer, 300 ohms, 5W, Wire-Wound | | | | | |
| 110 | R26 | Z | | 1 | | | | | | | | | | A10-200 | Potentiometer, 200 ohms, 4W, Wire--Wound | | | | | |
| 111 | R27 | T | | 1 | | | | | | | | | | WW 102 | Potentiometer, 1K ohms, 5W, Wire-Wound | | | | | |
| 112 | | L | | 1 | | | | | | | | | | 17408S | Cord, 3 Conductor with 3 Contact Solarized Molded male plug. | | | | | |
| 113 | | BD | | 1 | | | | | | | | | | 7555 | Connector Body, 3-Wire | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE

# BEHLMAN-INVAR PARTS LIST

MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 114 | | GX | | 20 | | | | | | | | | | 2N1542 | Transistors | | | | | |
| 115 | | K | | 1 | | | | | | | | | | 009F-0028 | Plate Insulation | | | | | |
| | | | | Ref. | | | | | | | | | | 009-0096 | Harness | | | | | |
| | | | | Ref. | | | | | | | | | | 009-0097 | Jumper List | | | | | |
| | | | | Ref. | | | | | | | | | | 009-0099 | Schematic | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-9-62 APPROVED BY: DATE

| REV. | ITEM NO. | DATE | DESCRIPTION | APPROVAL |
|---|---|---|---|---|
| 1104 | | 2-19-63 | Retyped and Revised per ECO 1104. | |

| | | | BEHLMAN-INVAR ELECTRONICS CORP. | Number |
|---|---|---|---|---|
| Approved | | | PARTS LIST | 000-0105 |
| Checked | | | MODEL | |
| Prepared | | | TITLE Assembly, Zener Diode Heatsink | Sheet 1 of 2 |

ECO-01

BEHLMAN-INVAR PARTS LIST 000-0105

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ref. | | | | | | | | | | 000-0105 | Assembly, Zener Diode Heatsink |
| 1 | | | | 1 | | | | | | | | | | 000-0274 | Marking, Heatsink |
| 2 | | | | Ref. | | | | | | | | | | 000-0273 | Detail, Heatsink |
| 3 | CR9, CR10 | GX | | 2 | | | | | | | | | | 10M56Z10 | Zener Diode |

COMPILED BY: W. A. Rodgers DATE 2-19-63 APPROVED BY: DATE



8T-21

| REV. | ITEM NO. | DATE | DESCRIPTION | APPROVAL |
|---|---|---|---|---|
| | | 9-23-64 | Retyped | KE |

| | | | | |
|---|---|---|---|---|
| | | | BEHLMAN-INVAR ELECTRONICS CORP. | Number |
| Approved | | | PARTS LIST | 000-0138 |
| Checked | | | MODEL | |
| Prepared | KL | 9/24/64 | TITLE DIODE AND FILTER BOARD | Sheet 1 of 2 |

BEC-21

BEHLMAN-INVAR PARTS LIST Diode and Filter Board 000-0138 MODEL NO.

| ITEM NO. | REF. NO. | MFR. CODE | REC S/P | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ref. | | | | | | | | | | 000-0138 | Assembly, Diode and Filter Board | | | | | |
| 1 | | K | | 1 | | | | | | | | | | 000-0138 | Artwork, Diode and Filter Board | | | | | |
| 2 | | K | | Ref. | | | | | | | | | | 000-0160 | Detail, Diode and Filter Board | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | |
| 4 | C2 | AB | | 1 | | | | | | | | | | BR 50-150 | Capacitor, 50 mfd, 150 vdc, Fixed Electrolytic Tubular | | | | | |
| 5 | C3, C4 | CF | | 2 | | | | | | | | | | TD-250-150 | Capacitor, 250 mfd, 150 vdc, Fixed Electrolytic Tubular | | | | | |
| 6 | CR5 thru CR8 | KE | | 4 | | | | | | | | | | SC 4 | Diode, Power | | | | | |

COMPILED BY: Ken Leverenz DATE 9-23-64 APPROVED BY: DATE

| REV. or ECO | ITEM NO. | DATE | DESCRIPTION | APPROVAL |
|---|---|---|---|---|
| 703 | 21, 31, 32, 34, 46 | 8-13-62 | Changed per ECO 703 | |
| 1521 | 49-55 | 12-16-63 | Added these items per ECO-1521. | |

| | | | | |
|---|---|---|---|---|
| | | | BEHLMAN ENGINEERING CO. | Number 009-0600 |
| Approved | | | PARTS LIST | |
| Checked | | | MODEL TPA-30 | |
| Prepared | | | TITLE PC Board No. 1 | Sheet 1 of 6 |

BEC-21

BEHLMAN-INVAR PARTS LIST PC Board No. 1 009-0600 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ref. | | | | | | | | | | 009-0600 | Assembly, PC Board No. 1 | | | | | |
| 1 | | K | | 1 | | | | | | | | | | 000-1002 | Detail, PC Board No. 1 | | | | | |
| 2 | | K | | 1 | | | | | | | | | | 000-1001 | Artwork, PC Board No. 1 | | | | | |
| 3 | | K | | 1 | | | | | | | | | | 000-0009 | Plate, Transistor Mounting | | | | | |
| 4 | | AQ | | 3 | | | | | | | | | | 3304 | Socket, Transistor | | | | | |
| 5 | | KK | | 2 | | | | | | | | | | 100-200-5-11 | Clip, Transistor | | | | | |
| 6 | | | | 2 | | | | | | | | | | | Screw, 2-56x1/4 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 7 | | | | 2 | | | | | | | | | | | Washer, No. 2 Cad. Pl. Stl. Splitlock | | | | | |
| 8 | | FD | | 2 | | | | | | | | | | 2161 | Washer, No. 4 Fibre Flat | | | | | |
| 9 | | | | 2 | | | | | | | | | | | Washer, No. 2 Cad. Pl. Stl. Flat | | | | | |
| 10 | | | | 2 | | | | | | | | | | | Nut, 2-56 Cad. Pl. Stl. Hex | | | | | |
| 11 | | | | 2 | | | | | | | | | | | Screw, 6-32x13/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 12 | | | | 6 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Flat | | | | | |
| 13 | | | | 4 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Splitlock | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-2-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST PC Reqrd No. 1 009-0600 MODEL NO. TPA-,0

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | | | | 2 | | | | | | | | | | | Nut, 6-32 Cad. Pl. Stl. Hex Radio Pattern | | | | | |
| 15 | | | | 2 | | | | | | | | | | | Screw, 6-32x5/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 16 | | | | 4 | | | | | | | | | | | Nut, 6-32 Cad. Pl. Stl. Hex | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | | |
| 21 | Q2, Q4, Q5 | GX | | 3 | | | | | | | | | | 2N1185 | Transistor | | | | | |
| 22 | Q1, Q6, Q7, Q8 | GX | | 4 | | | | | | | | | | 2N652 | Transistor | | | | | |
| 23 | Q3 | GX | | 1 | | | | | | | | | | 2N1545 | Transistor | | | | | |
| 24 | CR11 | KE | | 1 | | | | | | | | | | SC-4 | Diode | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-2-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST PC Board No. 1 009-0600 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | CR12 | GX | | 1 | | | | | | | | | | 1N2622 | Diode | | | | | |
| 26 | C8, C9 | AB | | 2 | | | | | | | | | | BR 50-50 | Capacitor, 50 μfd, 50 vdc, Fixed Electrolytic Tubular | | | | | |
| 27 | C7 | B | | 1 | | | | | | | | | | P83Z | Capacitor, 0.001 μfd, 600vdc, Fixed Metalized Paper Tubular | | | | | |
| 28 | C6 | B | | 1 | | | | | | | | | | P83Z | Capacitor, 0.02 μfd, 200 vdc, Fixed Metalized Paper Tubular | | | | | |
| 29 | R34 | BY | | 1 | | | | | | | | | | 4444 | Resistor, 5.6K ohms, 3W, Fixed Wire-Wound | | | | | |
| 30 | R33 | BY | | 1 | | | | | | | | | | 4373 | Resistor, 30 ohms, 3W, Fixed Wire-Wound | | | | | |
| 31 | R32 | C | | 1 | | | | | | | | | | | Resistor, 24K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 32 | R31 | C | | 1 | | | | | | | | | | | Resistor, 1.8K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 33 | R30 | C | | 1 | | | | | | | | | | | Resistor, 220K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 34 | R25 | BY | | 1 | | | | | | | | | | 4403 | Resistor, 270 ohms, 3W, Fixed Wire-Wound | | | | | |
| 35 | R24 | Z | | 1 | | | | | | | | | | A43-3000 | Potentiometer, 3K ohms, 2W, Wire-Wound | | | | | |
| 36 | R23 | C | | 1 | | | | | | | | | | | Resistor, 150K ohms, 1/2W, 5% Fixed Carbon | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-2-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST 009-0600 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | M.R. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | 5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | R22 | C | | 1 | | | | | | | | | | | Resistor, 4.7K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 38 | R21 | C | | 1 | | | | | | | | | | | Resistor, 10K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 39 | R20 | BY | | 1 | | | | | | | | | | 4436 | Resistor, 3.3K ohms, 3W, Fixed Wire-Wound | | | | | |
| 40 | R19 | C | | 1 | | | | | | | | | | | Resistor, 15K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 41 | R15 | C | | 1 | | | | | | | | | | | Resistor, 100 ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 42 | R14 | C | | 1 | | | | | | | | | | | Resistor, 33K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 43 | R13 | C | | 1 | | | | | | | | | | | Resistor, 180K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 44 | R12 | C | | 1 | | | | | | | | | | | Resistor, 10 ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 45 | R11 | C | | 1 | | | | | | | | | | | Resistor, 330 ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 46 | R10 | C | | 1 | | | | | | | | | | | Resistor, 27K ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 47 | R9 | C | | 1 | | | | | | | | | | | Resistor, 510 ohms, 1/2W, 5% Fixed Carbon | | | | | |
| 48 | R8 | C | | 1 | | | | | | | | | | | Resistor, 51 ohms, 1W, 10% Fixed Carbon | | | | | |

COMPILED BY: W.A.Rodgers DATE 7-2-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST PC Board No. 009-0600 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | | | | 2 | | | | | | | | | | | Screw, 6-32x7/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 50 | | | | 2 | | | | | | | | | | | Washer No. 6 Cad. Pl. St l. Splitlock | | | | | |
| 51 | | | | 2 | | | | | | | | | | | Nut, (small pattern) Hex | | | | | |
| 52 | | | | 2 | | | | | | | | | | | Screw, 8-32x5/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 53 | | | | 4 | | | | | | | | | | | Washer, Cad. Pl. Stl. No. 8 Splitlock | | | | | |
| 54 | | | | 6 | | | | | | | | | | | Washer, No. 8 Cad. Pl. Stl. Flat | | | | | |
| 55 | | | | 4 | | | | | | | | | | | Nut, 8-32 Cad. Pl. Stl. Hex | | | | | |

COMPILED BY: DATE 12-16-63 APPROVED BY: DATE

| REV. | ITEM NO. | DATE | DESCRIPTION | APPROVAL |
|---|---|---|---|---|
| 1224 | 7 thru 11, 15, 16, 17, 18 | 4-23-63 | Changed these items per ECO 1224. | |

| | | | | |
|---|---|---|---|---|
| | | | BEHLMAN ENGINEERING CO. | Number |
| Approved | | | PARTS LIST | 009-1000 |
| Checked | | | MODEL TPA-30 | |
| Prepared | | | TITLE PC Board No. 2 | Sheet 1 of 3 |

BEC-21

BEHLMAN-INVAR PARTS LIST PC BOARD NO. 2 009-1000 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ref. | | | | | | | | | | 009-1000 | Assembly, Heatsink PC Board, PCB No. 2 | | | | | |
| 1 | | K | | 1 | | | | | | | | | | 009-1002 | Detail, Heatsink PC Board, PCB No. 2 | | | | | |
| 2 | | K | | 1 | | | | | | | | | | 000-0218 | Plate, Transistor Mounting | | | | | |
| 3 | R37A thru R37T | K | | 20 | | | | | | | | | | 000-0090 | Resistor, 0.3 ohm, 2W, Wire-Wound Spring Type | | | | | |
| 4 | R28 | C | | 1 | | | | | | | | | | | Resistor, 27K ohms, 2W, 10%, Fixed Carbon | | | | | |
| 5 | R29 | BY | | 1 | | | | | | | | | | 4435 | Resistor, 3K ohms, 3W, Fixed Wire -Wound | | | | | |
| 6 | Q9-1, Q9-2 | GX | | 2 | | | | | | | | | | 2N1542 | Transistor | | | | | |
| 7 | | | | 4 | | | | | | | | | | | Screw, 6-32x9/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 8 | | | | 12 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Flat | | | | | |
| 9 | | | | 8 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Splitlock | | | | | |
| 10 | | | | 12 | | | | | | | | | | | Nut, 6-32 Cad. Pl. Stl. Hex | | | | | |
| 11 | | | | 4 | | | | | | | | | | | Screw, 6-32x1/2 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |

COMPILED BY: W. A. Rodgers DATE 6-29-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST — PC Board No. 2 009-1000 — MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | 5 | | | | | | | | | | | Screw, 8-32x5/8 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 16 | | | | 5 | | | | | | | | | | | Washer, No. 8 Cad. Pl. Stl. Flat | | | | | |
| 17 | | | | 10 | | | | | | | | | | | Washer, No. 8 Cad. Pl. Stl. Splitlock | | | | | |
| 18 | | | | 10 | | | | | | | | | | | Nut, 8-32 Cad. Pl. Stl. Hex | | | | | |
| 19 | | DG | | 66 | | | | | | | | | | 1200C | Terminal | | | | | |
| 20 | | KP | | 4 | | | | | | | | | | S5931 | Eyelet, Double Funnel | | | | | |
| 21 | | K | | 1 | | | | | | | | | | 009-1001 | Artwork, Heatsink PC Board, PCB No. 2 | | | | | |

COMPILED BY: W. A. Rodgers DATE 6-29-62 APPROVED BY: DATE

| REV. | ITEM NO. | DATE | DESCRIPTION | APPROVAL |
|---|---|---|---|---|
| | | | | |

| | | | BEHLMAN ENGINEERING CO. | Number |
|---|---|---|---|---|
| Approved | | | PARTS LIST | 009-0400 |
| Checked | | | MODEL TPA-30 | |
| Prepared | | | TITLE Assembly, Terminal Board No. 4 | Sheet 1 of 2 |

BEC-21

BEHLMAN-INVAR PARTS LIST TB4 Assem 1 009-0400 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND $ REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ref. | | | | | | | | | | 009-0400 | Assembly, Terminal Board No.4 | | | | | |
| 1 | | K | | 1 | | | | | | | | | | 009-0402 | Detail, Terminal Board No. 4 | | | | | |
| 2 | | K | | 1 | | | | | | | | | | 009-0401 | Markings, Terminal Board No.4 | | | | | |
| 3 | | K | | 1 | | | | | | | | | | 000-0011 | Bracket, Resistor | | | | | |
| 4 | | DG | | 10 | | | | | | | | | | 1200-C | Terminal | | | | | |
| 5 | C12 | AB | | 1 | | | | | | | | | | BR 2000-6 | Capacitor, 2000 µfd, 6 vdc, Fixed Electrolytic Tubular | | | | | |
| 6 | R16 | Z | | 1 | | | | | | | | | | A43-200 | Potentiometer, 200 ohms, 2W, Wire-Wound | | | | | |
| 7 | R6 | BY | | 1 | | | | | | | | | | 4399 | Resistor, 200 ohms, 3W, Fixed Wire-Wound | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-5-62 APPROVED BY: DATE

| REV. | ITEM NO. | DATE | DESCRIPTION | APPROVAL |
|---|---|---|---|---|
| 1305 | 2 | 7-19-63 | Moved to item 17 changed qty from 4 to 1 and added -1. changed per ECO 1305. | |
| | 18, 19, 20 | 7-19-63 | Added per ECO 1305. | |
| 1507 | 7 | 12-13-63 | Deleted. Was 2303. Spacer, Hex. (FD) qty 2 Changed per ECO-1507. | |
| | 7 | | Added per ECO-1507. | |

| | | | BEHLMAN ENGINEERING CO. | Number |
|---|---|---|---|---|
| Approved | | | PARTS LIST | 009-0500 |
| Checked | | | MODEL TPA-30 | |
| Prepared | | | TITLE Rectifier Stack, Assembly | Sheet 1 of 3 |

BEHLMAN-INVAR PARTS LIST 009-0500 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | MFR. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ref. | | | | | | | | | | 009-0500 | Assembly, Rectifier Stack | | | | | |
| 1 | | K | | 2 | | | | | | | | | | 009-0501 | Bracket, Rectifier | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | |
| 3 | | K | | 1 | | | | | | | | | | 000-0103 | Washer, Rectifier | | | | | |
| 4 | | K | | 4 | | | | | | | | | | 000-0238-1 | Spacer, Rectifier | | | | | |
| 5 | | K | | 4 | | | | | | | | | | 000-0238-2 | Spacer, Rectifier | | | | | |
| 6 | | K | | 2 | | | | | | | | | | 000-0238-3 | Spacer, Rectifier | | | | | |
| 7 | | DG | | 2 | | | | | | | | | | 1551 M | Stand-Off, Hex | | | | | |
| 8 | | | | 2 | | | | | | | | | | | Rod, 6-32x3-3/4 Cad. Pl. Stl. Threaded | | | | | |
| 9 | | | | 5 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Splitlock | | | | | |
| 10 | | | | 5 | | | | | | | | | | | Washer, No. 6 Cad. Pl. Stl. Flat | | | | | |
| 11 | | | | 5 | | | | | | | | | | | Nut, 6-32 Cad. Pl. Stl. Hex | | | | | |
| 12 | | | | 1 | | | | | | | | | | | Screw, 6-32x1-3/16 Cad. Pl. Stl. Phillips Recessed Panhead | | | | | |
| 13 | | FD | | 2 | | | | | | | | | | 2153 | Washer, No. 6 Fibre Shoulder | | | | | |
| 14 | CR1, CR2, CR3, CR4 | KX | | 4 | | | | | | | | | | 1N1184A | Diode, Rectifier | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-5-62 APPROVED BY: DATE

BEHLMAN-INVAR PARTS LIST Rectifier Stack 009-0500 MODEL NO. TPA-30

| ITEM NO. | REF. NO. | R. CODE | I.D. | QUANTITY PER ASSEMBLY 0 | -1 | -2 | -3 | -4 | -5 | -6 | -7 | -8 | -9 | PART NUMBER | DESCRIPTION | QUANTITIES AND COST REQ. | ISSUED | SHORT | PRICE | AMT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | | | | 4 | | | | | | | | | | | Hardware, Diode Mounting (Supplied with Diodes. | | | | | |
| 16 | | | | A/R | | | | | | | | | | | Tubing, Woven Glass | | | | | |
| 17 | | K | | 1 | | | | | | | | | | 009-0502-1 | Rectifier Fin | | | | | |
| 18 | | K | | 1 | | | | | | | | | | 009-0502-2 | Rectifier Fin | | | | | |
| 19 | | K | | 1 | | | | | | | | | | 009-0502-3 | Rectifier Fin | | | | | |
| 20 | | K | | 1 | | | | | | | | | | 009-0502-4 | Rectifier Fin | | | | | |

COMPILED BY: W. A. Rodgers DATE 7-5-62 APPROVED BY: DATE

# ENGINEERING ORDER

☒ CHANGE ☐ DEVIATION ☐ STOP ORDER

BEHLMAN-INVAR ELECTRONICS CORP. SANTA MONICA, CALIFORNIA

| | | | |
|---|---|---|---|
| Model No. TPA-30K TPA-30 | Dwg. No. 009K-0000 009A-0000 | E.O. No. 2460 | |
| Dwg. Title Main Assembly | Job No. | Sht. 1 of 1 | |
| Manual or P.P.B. affected Yes (No) | Requested By TEST PA | Date 3/18/65 | |

| REASON FOR CHANGE ORDER | DISPOSITION OF PARTS | | | | DEPARTMENTAL SIGNATURES | |
|---|---|---|---|---|---|---|
| ☒ Drafting Error | Status | In Process | In Stock | In Assy. | Cognizant Eng. | |
| ☐ Mfg. Error | Use as is | ✓ | ✓ | ✓ | Design Eng. DW | Drawn |
| ☐ Design Error | Rework | | | | Co-ord Eng. | Checked |
| ☐ Redesign | Scrap | | | | Prod. Control | Cognizant Eng. |
| ☐ Customer Request | Other | | | | Publications | Final Approval |
| ☐ Other | Effectivity 3/18/65 | Serial No. From — To — | | | Purchasing | |
| ☐ Parts List | | | | | Quality Control P.H.A. 3/18/65 | |

DESCRIPTION OF CHANGE

Notes 104 and 105 are REVERSED - Should be

WAS

| | | |
|---|---|---|
| 106 | | |
| 105 | | FUSE, 30 Amp |
| 104 | | FUSE, 25 Amp |
| 103 | | |

IS

| | | |
|---|---|---|
| 106 | | |
| 104 | | FUSE, 30 Amp |
| 105 | | FUSE, 25 Amp |
| 103 | | |

MANDATORY

MP MASTER
MA29436